# ENGINEERING NEWS-RECORD

Now—asphalt gunite lines canals p. 35

A McGRAW-HILL PUBLICATION

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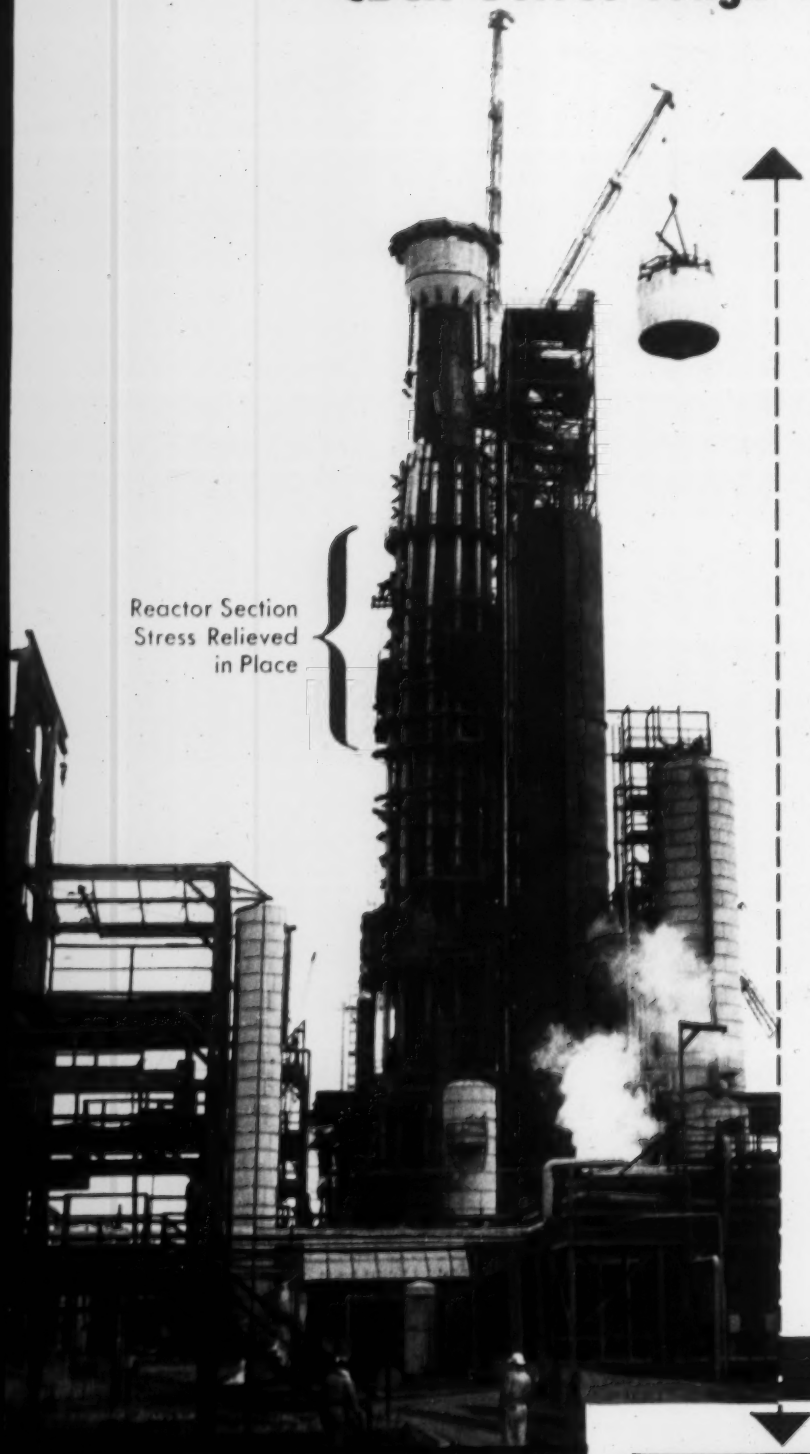
UNIVERSITY MICROFILMS IN
S B POWER GE

# CB&I Solves tough erection problems on 360 ft. high Houdriflow Units at Toledo and Marcus Hook




360-ft. high Houdriflow unit at Marcus Hook during erection. It is one of two Houdriflow units fabricated at our Greenville and Birmingham plants through the Catalytic Construction Company for Sun Oil Company's Marcus Hook and Toledo Refineries.

Many problems confronted Chicago Bridge & Iron Company during the erection of two Houdriflow units that they fabricated and erected for the Sun Oil Company Toledo and Marcus Hook refineries. One was the lifting of 94-ton cooling coil sections 300 feet in the air. This was handled by derricks mounted on top of 283-ft. towers designed and built by CB&I especially for these jobs.

### FIELD STRESS RELIEVING

Field stress relieving was an important problem that was successfully solved. Furnaces were built at Marcus Hook and Toledo to stress relieve 13 sections with internal and external heads, for each Houdriflow unit. The 70-ft. long reactor sections were stress relieved *in place* with 20-ton hot air furnaces mounted on the stair towers . . . *approximately 160-ft. in the air.*

### FIELD X-RAYING

All the main seams in the reactor and regenerator, some of which were $2^{3}/_{8}$-in. thick, were 100 per cent X-rayed in the field.

When planning steel plate structures let CB&I experience and craftsmanship work for you. Write our nearest office for additional information.

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# Economical 5-arch stream crossing made from Beth-Cu-Loy pipe

Bridges are not always expensive, as this interesting example shows. Here we see five 60-in. galvanized Beth-Cu-Loy culverts laid side by side, with concrete retaining walls to hold back 3 ft of roadway fill. The result: an economical, easy-to-build stream crossing that will last for years.

In a wide variety of jobs the versatility of Beth-Cu-Loy corrugated galvanized steel in drainage structures is gaining rapid recognition. This stems from a number of reasons of which strength, of course, is one. Light weight makes handling, shipping and installing less costly. Flexibility permits the pipe to flex with the fill, conform to grade and alignment, absorb impact, vibration and the action of shifting and freezing soils.

Beth-Cu-Loy is open-hearth steel, with a small amount of copper added to provide resistance to corrosion. As an additional protection, the Beth-Cu-Loy corrugated sheets are given a tight 2-oz coating of Prime Western zinc. Some corrugated steel drainage structures have been in service fifty years and more, outliving the original project, and they haven't said "uncle" yet!

Beth-Cu-Loy galvanized sheets conform to the rigid specs of the American Association of State Highway Officials. For further ideas on how this durable material might serve you and your community, just get in touch with any Bethlehem district sales office, and they will direct you to one or more fabricators who use Beth-Cu-Loy Sheets.

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**BETHLEHEM STEEL**

BETHLEHEM STEEL

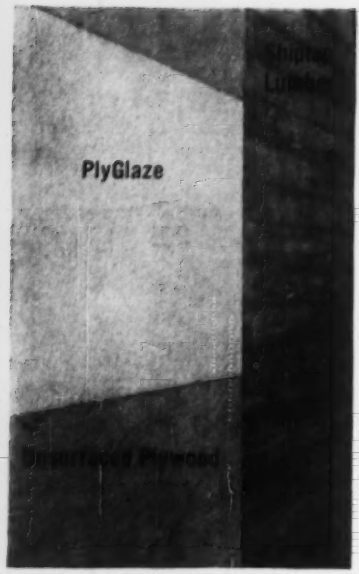


**Photo taken right after stripping forms proves that you get the...**

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**ENGINEERING NEWS-RECORD Vol. 157, No. 11, September 13, 1956**

Published weekly by McGraw-Hill Publishing Company; James H. McGraw (1860-1948), Founder. **Executive, Editorial, Advertising and Subscription Offices, McGraw-Hill Building, 330 W. 42nd St., New York 36, N. Y.** Publication Office, 99-129 North Broadway, Albany 1, N. Y. Donald C. McGraw, President; Paul Montgomery, Executive Vice-President; Joseph A. Gerardi, Executive Vice-President and Treasurer; Hugh J. Kelly, Executive Vice-President; John J. Cooke, Secretary; Nelson Bond, Executive Vice-President, Publications Division; Ralph B. Smith, Vice-President and Editorial Director; Joseph H. Allen, Vice-President and Director of Advertising; J. E. Blackburn, Jr., Vice-President and Circulation Director. **SUBSCRIPTIONS:** Address correspondence to Engineering News-Record Subscription Service, 99-129 North Broadway, Albany 1, N. Y., or 330 W. 42nd St., New York 36, N. Y. Allow one month for change of address. Subscriptions are solicited only from persons with an identifiable commercial or professional interest in construction and building. **Position and company connection must be indicated on subscription orders.** Single copies 35¢. Subscription rates: United States and possessions, $6.00 a year; $9.00 for two years; $12.00 for three years. Canada $8.00 a year; $12.00 for two years; $16.00 for three years. Other Western Hemisphere and the Philippines, $15.00 a year; $25.00 for two years; $30.00 for three years. All other countries $20.00 a year; $30.00 for two years; $40.00 for three years. Second class mail privileges authorized at Albany, New York. Printed in U. S. A. Copyright 1956 by McGraw-Hill Publishing Co., Inc.—All Rights Reserved.

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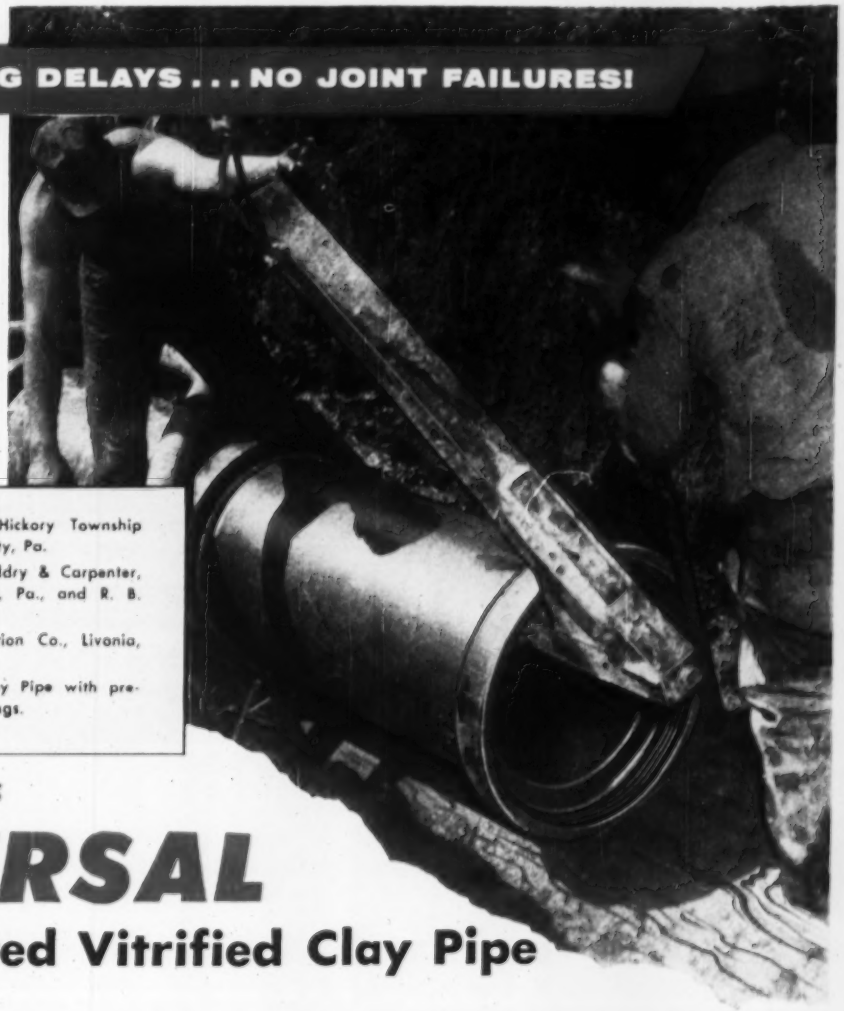

**PROJECT:** New sanitary system, Hickory Township Municipal authority, Mercer County, Pa.

**ENGINEERS:** Gannet, Fleming, Corddry & Carpenter, Consulting Engineers, Harrisburg, Pa., and R. B. McCurdy, Resident Engineer.

**CONTRACTOR:** Holloway Construction Co., Livonia, Michigan.

**PIPE:** 15" UNIVERSAL Vitrified Clay Pipe with pre-assembled TYLOX Flexible Couplings.

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It is the only compactor having in its workhead 6 independent compactor units which can be individually as well as simultaneously operated. It is the only compactor in which the compactor units may be grouped and regrouped on the job to ideally fit each and every compaction project (see illustrations). Standard width 13'3". This extraordinary flexibility is a tremendous time and money-saver. It provides perfect coverage with no lost motion, and makes it possible to get into places with the JACKSON that other equipment can not touch. Any individual unit may be detached and fitted with a furnished operating handle to convert it to the identical and very popular manually-guided, self-propelled Jackson Compactor, so widely used on a multitude of small jobs, for perfect consolidation in places inaccessible to other equipment.

EACH OF THE COMPACTING UNITS IN THE JACKSON MULTIPLE COMPACTOR DELIVERS UP TO 4200 TWO-TON BLOWS PER MINUTE. Hence, specified densities are quickly achieved in granular soil bases, sub-bases and all materials normally used in macadam bases and pavement widening projects, large fills and similar jobs.

The Jackson Multiple Compactor is by long odds the handiest, most convenient and efficient compacting machine on the market today. It will save you many, many times its cost in both time and money. See it at your nearby distributor. His name and literature on request.

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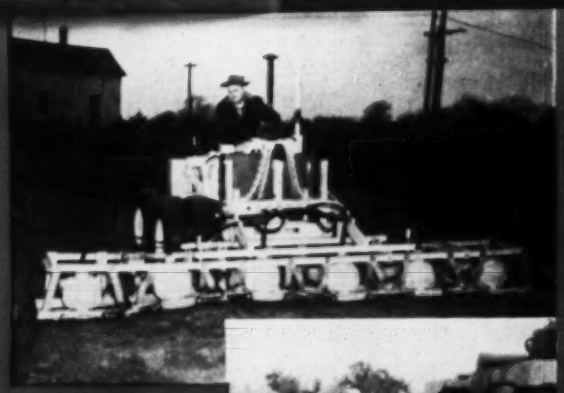
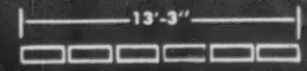
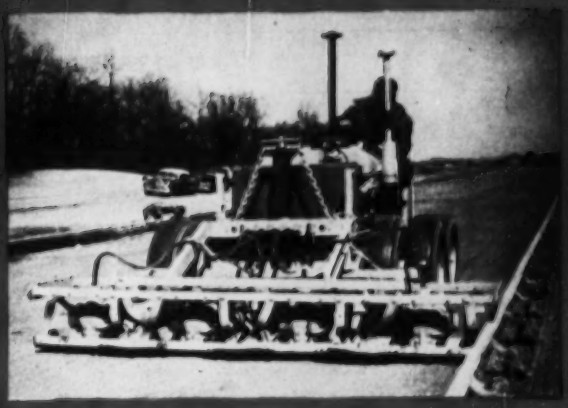
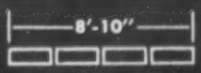


In the photo at right note how the end compactor unit automatically, without any adjustment, assumes the correct position to consolidate the shoulder of the base course to prevent raveling and erosion.

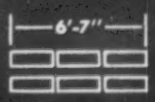



Utilizing the 6 Compacting units in line for maximum width (13'3") coverage. Working speeds: 0 to 60 ft. per min. Reverse: 5½ miles per hour.



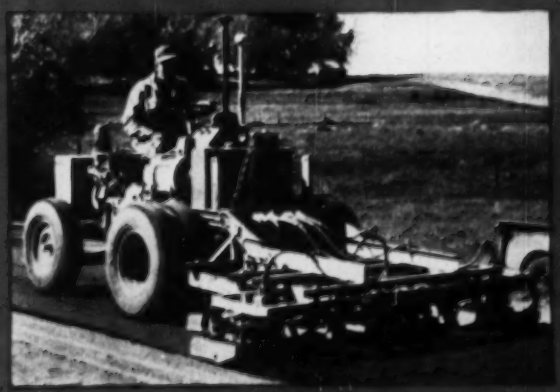


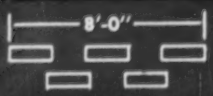

In this application the number of compactor units has been reduced to 4.




"Three following three" tandem arrangement of compactor units ahead of tractor, for maximum, one-pass consolidation of granular base course.

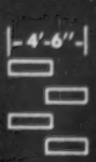
Furnished with operating handles, single compacting units may be used for jobs like these: Left: Consolidating gravel back-fill adjacent to parking lot retaining wall. Right: Consolidating bituminous concrete pavement up close against building wall — not accessible with other equipment. Unit compactor bases supplied from 12" to 26" in width.






AND VARIABLE

This arrangement was adopted for the 4" to 5" bottom course of a 24' soil-cement paving project. Variable in width within limits.

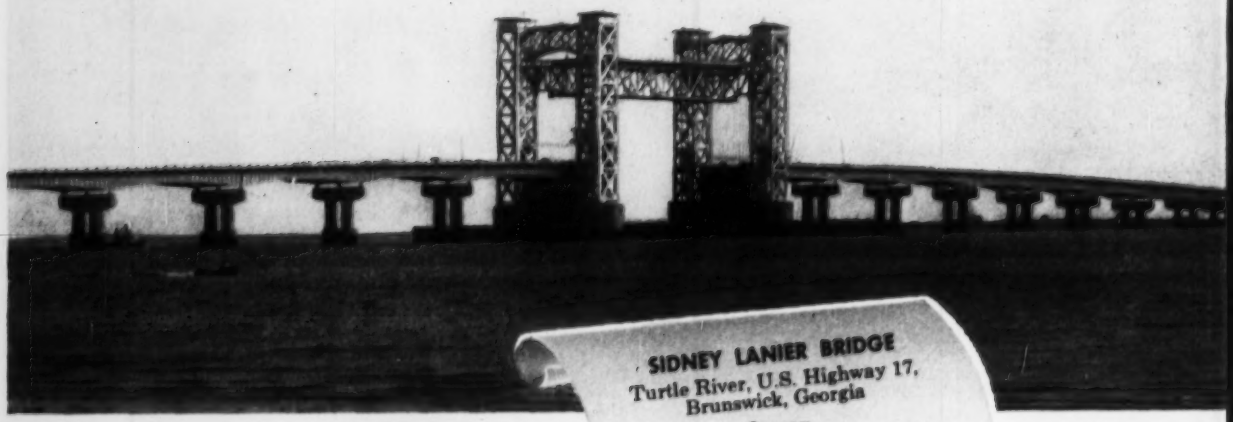



AND VARIABLE

Towed at the side, this arrangement of compactor units provides perfect, one-pass consolidation of widening course. Variable in width within limits.

# On this 295′ vertical lift span

# I-BEAM-LOK saves



**SIDNEY LANIER BRIDGE**
Turtle River, U.S. Highway 17,
Brunswick, Georgia

**Owner:**
State Toll Bridge Authority of Georgia

**Supervising Engineers:**
Georgia State Highway Department

**Designed by:**
Sverdrup & Parcel, Inc.,
Consulting Engineers,
St. Louis, Mo.

**Consulting Engineers to State Toll Bridge Authority for supervision of construction of lift span and design of toll plaza facilities:**
J. E. Greiner Company, Consulting Engineers, Baltimore, Md. and Albany, Georgia.

**Principal Fabricator & Erector:**
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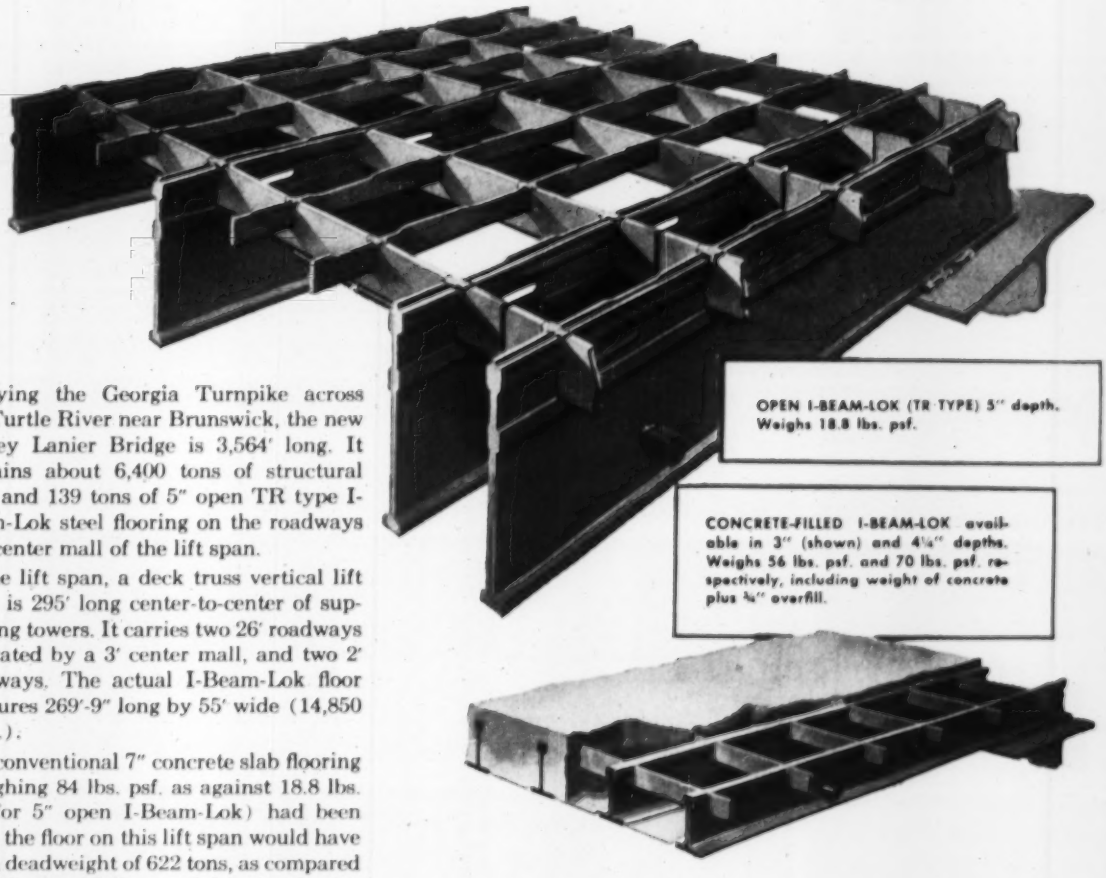
United States Steel, 1954-1956

# USS AMBRIDGE

## 483 tons flooring deadweight


OPEN I-BEAM-LOK (TR TYPE) 5" depth. Weighs 18.8 lbs. psf.
CONCRETE-FILLED I-BEAM-LOK available in 3" (shown) and 4¼" depths. Weighs 56 lbs. psf. and 70 lbs. psf. respectively, including weight of concrete plus ¼" overfill.

Carrying the Georgia Turnpike across the Turtle River near Brunswick, the new Sidney Lanier Bridge is 3,564' long. It contains about 6,400 tons of structural steel and 139 tons of 5" open TR type I-Beam-Lok steel flooring on the roadways and center mall of the lift span.

The lift span, a deck truss vertical lift type, is 295' long center-to-center of supporting towers. It carries two 26' roadways separated by a 3' center mall, and two 2' walkways. The actual I-Beam-Lok floor measures 269'-9" long by 55' wide (14,850 sq. ft.).

If conventional 7" concrete slab flooring (weighing 84 lbs. psf. as against 18.8 lbs. psf. for 5" open I-Beam-Lok) had been used, the floor on this lift span would have had a deadweight of 622 tons, as compared with the actual floor weight of only 139 tons with open I-Beam-Lok . . . *a clear saving of 483 tons!*

Delivered in completely fabricated units ready for erection, USS AmBridge I-Beam-Lok is the modern bridge flooring for today's heavy traffic. It combines light weight and ensuing reduced costs of supporting members with roadway rigidity, ease of erection, a smooth, hard surface and low maintenance costs.

I-Beam-Lok bridge flooring is available in both open and concrete-filled types. Our new booklet gives complete information on both types of USS AmBridge I-BEAM-LOK. For your copy, write to American Bridge or contact the nearest sales office.

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# USS AMBRIDGE I-BEAM-LOK BRIDGE FLOORING

UNITED STATES STEEL

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## Reader Comment

### Housing Rehabilitation

SIR—In your Aug. 9 issue, your Washington Observer notes:

> "The housing slump is continuing—and government action may be coming to try to stop it. Government officials are not as worried as are private homebuilders, but they acknowledge there is little improvement in sight without new remedies being tried."

This is most interesting to us in the Los Angeles Department of Building and Safety because we are applying what could be termed a "new remedy."

This remedy is housing rehabilitation. It is not primarily aimed at taking up the slack in housing starts, but to rehabilitate and restore blighted neighborhoods—the same type of blighted neighborhoods that disgrace every city in the United States. However, as a byproduct, the program has stimulated housing reconstruction to the extent of an estimated $200 million a year in the City of Los Angeles. Only about half of this is reflected in permit valuation as much of the work is renovation and remodeling work requiring no permit.

Los Angeles building permits are running at the highest level in the city's history. Of course this cannot be entirely attributed to rehabilitation but much of it can. This should get the serious attention of the construction industry.

Here is a remedy for the slump in housing—a remedy that does not call for any new shot-in-the-arm stimulant by Washington. Everything needed is available, even the organized promotion of renewal and rehabilitation programs.

Financing is already available through Section 220 of the Federal Housing Act of 1954 and the recently liberalized Title I Home Improvement Loans. In addition, banks are arrang-

**Engineering News-Record welcomes expression of opinion from its readers. Comment should be as brief as possible and pertinent to subjects of current construction importance.**

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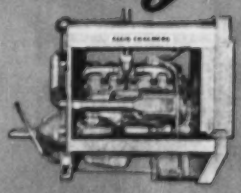
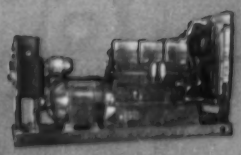
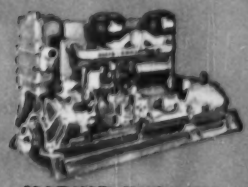


OPEN OR ENCLOSED POWER UNITS



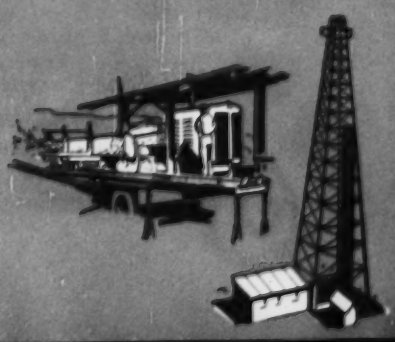
GENERATOR SETS

FAN-TO-FLYWHEEL ENGINES



MARINE ENGINES

## *any* USE



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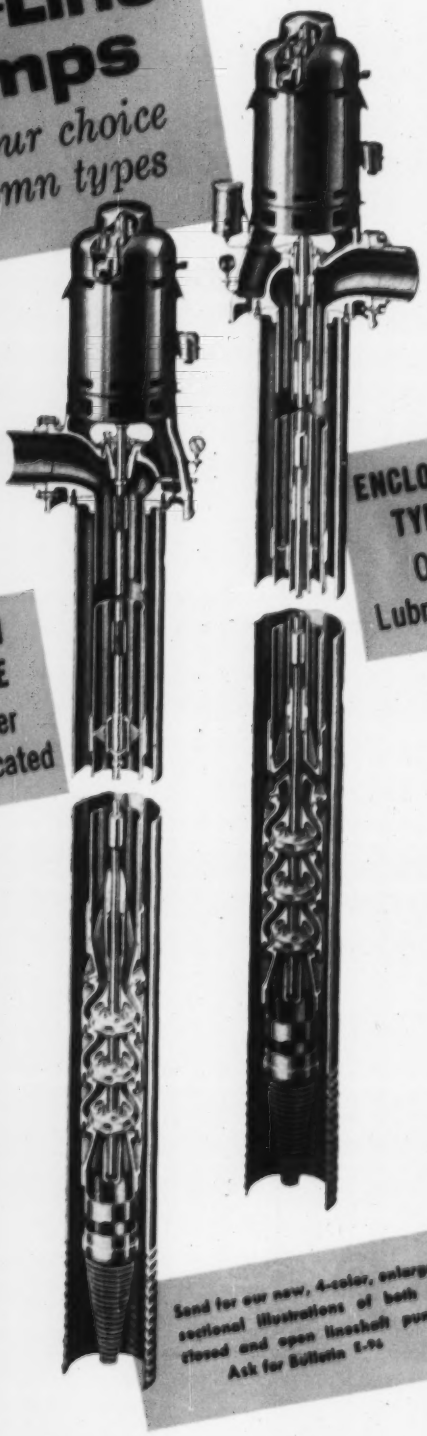


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## . . . Reader Comment

ing financing without asking for the protection of FHA insurance.

All segments of the construction industry should push housing rehabilitation throughout the nation. Several organized promotions are under way to motivate the home-owner to renovate and to remodel. We refer to ACTION, the movement sponsored by American Council to Improve our Neighborhoods; the Build America Better Program, by the National Association of Real Estate Boards; and Operation Home Improvement, by industry and financial institutions.

The combined efforts of private industry promotion and the rehabilitation of substandard housing brought about by the enforcement of local housing laws are capable of generating a multibillion dollar construction activity. If American cities would enter this field on an adequate scale, the drop in housing starts would be more than offset.

G. E. Morris
*Superintendent of Building*
*Dept. of Building and Safety*
*Los Angeles, Calif.*

### Shear Keys Still Necessary

Sir—In the article, "No Shear Keys Are Needed Here" (ENR, June 7, p. 61), W. E. Dean and A. M. Ozell report on a test of a prefabricated beam with a cast-in-place flange from which they conclude that shear keys between the two parts are unnecessary.

The test is not sufficiently conclusive to allow a generalization of the authors' findings. In order to learn how the bond between two concrete parts in contact but cast separately, compares with the bond in a continuous pour, tests should be extended to specimens of both types of beam with equal dimensions and equal loading arrangements and with at least some of the specimens having no steel connecting the two parts.

Such a series of tests might also throw light upon the physical behavior of a composite beam, the authors' concept of this behavior being open to considerable criticism. The statement that in the plane of contact between beam and flange—in a horizontal plane—the shearing force is always inclined, contradicts the very definition of a shearing force. In a horizontal plane of a beam nothing else occurs than a horizontal shearing stress (neglecting the insignificant compression due the load acting on top of the beam).

Notwithstanding the tensile stress in web reinforcement, there is no

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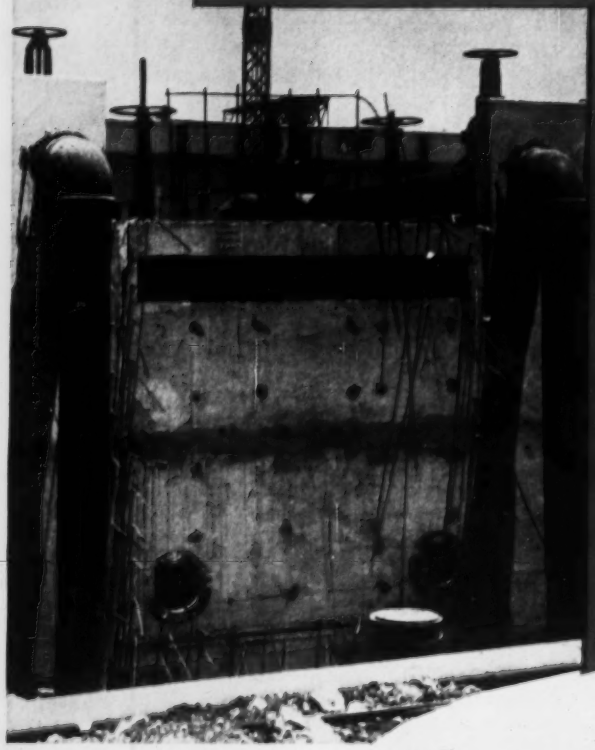
# Used so many ways



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CAST Q IRON

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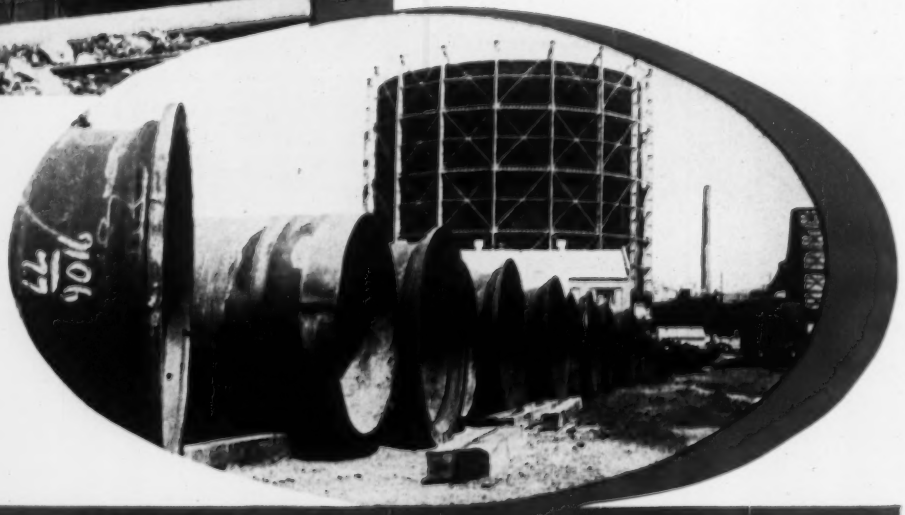
(above) Installation of mechanical joint and flanged cast iron pipe carrying salt water for Oceanarium, "Marineland of The Pacific" at Portuguese Bend, Calif.



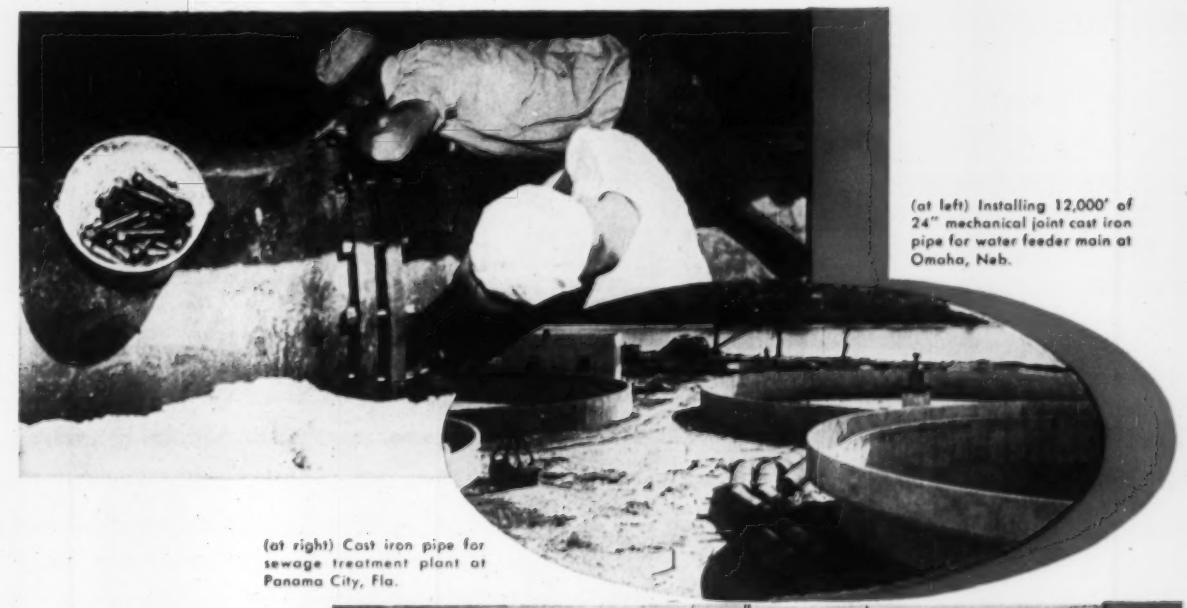
(at right) 48" mechanical joint cast iron pipe for gas main at Indianapolis, Ind.

# CAST IRON PIPE



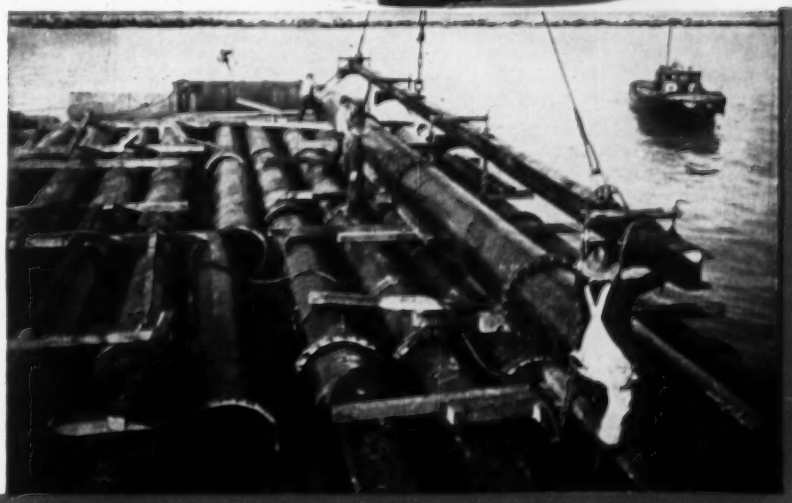
*Reader Comment*

# —always with confidence



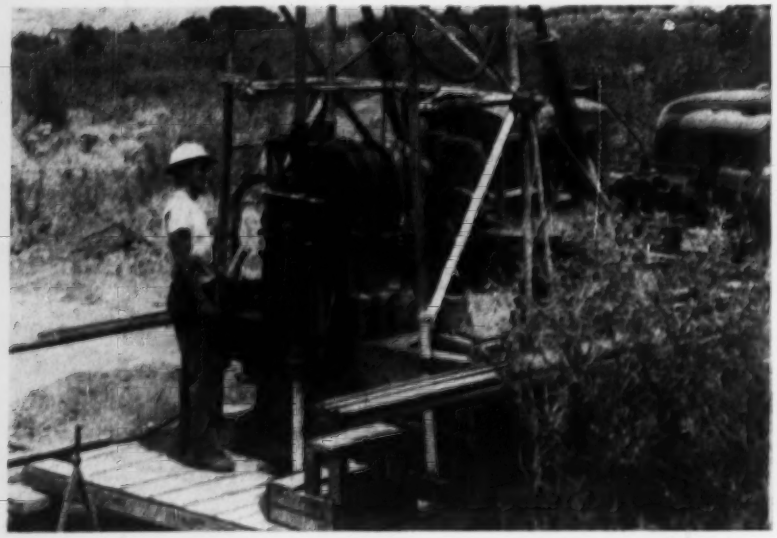
(at left) Installing 12,000' of 24" mechanical joint cast iron pipe for water feeder main at Omaha, Neb.

(at right) Cast iron pipe for sewage treatment plant at Panama City, Fla.



36" mechanical joint cast iron pipe for outfall sewer line at Los Angeles, Calif.

# SERVES FOR CENTURIES...



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## . . . Reader Comment

uplift between flange and web of a T-beam, just as there is no uplift acting between the chords of a steel truss and its web members. The actual function of the loops between the two parts of the test beam is therefore not fully revealed. They may have acted partly as stirrups and partly as dowels.

I do not mean to imply that bond between separately cast web and flange may not actually be much stronger than generally assumed. But, as long as conclusive tests are lacking, safety considerations compel the designer to assume at least a plane of weakness between the two parts, which impairs the isotropy of the material and therefore requires special attention.

ROBERT V. HAUER
*Structural Engineer*
*Albert Kahn, Inc.*
*Detroit, Mich.*

## CALENDAR

**New England Water Works Association**, annual convention, Mt. Washington Hotel, Bretton Woods, N. H., Sept. 16-19.

**Illuminating Engineering Society**, annual technical conference and fiftieth anniversary celebration, Statler Hotel, Boston, Mass., Sept. 17-21.

**Building Research Institute, Modern Masonry Conference**, Hall of Flags, U. S. Chamber of Commerce Bldg., 1615 H St., N.W., Washington, D. C., Sept. 19-20.

**American Public Works Association, Public Works Congress**, Texas Hotel, Fort Worth, Tex., Sept. 23-26.

**The Producers' Council, Inc.**, annual fall meeting, Wade Park Manor Hotel, Cleveland, Ohio, Sept. 25-26.

**Air Moving and Conditioning Association, Inc.**, annual meeting, the Greenbrier, White Sulphur Springs, W. Va., Oct. 2-4.

**Federation of Sewage and Industrial Wastes Associations**, annual convention, Hotel Statler, Los Angeles, Calif., Oct. 8-11.

**Noise Abatement Symposium**, seventh annual meeting, Hotel Sherman, Chicago, Ill., Oct. 11-12.

**Sixth Annual Drilling Symposium**, The University of Minnesota, Minn., October 11, 12, 13, 1956.

**American Society of Civil Engineers**, annual convention, Wm. Penn Hotel, Pittsburgh, Pa., Oct. 15-19.

**American Concrete Institute**, 9th annual regional meeting, Sheraton-Mount Royal Hotel, Montreal, Canada, Oct. 24-25.

**Society for Experimental Stress Analysis**, Deshler-Hilton Hotel, Columbus, Ohio, Oct. 31-Nov. 2.

**West Coast Noise Symposium**, third annual meeting, noise in buildings, Institute of Aeronautical Sciences Auditorium, Los Angeles, Calif., Nov. 12-13.

**American Public Health Association**, annual convention, Convention Hall, Atlantic City, N. J., Nov. 12-16.

**Building Research Institute**, conference on windows and glass in the exterior of buildings, United States Chamber of Commerce, Washington, D. C., Nov. 14-15.

**Illinois Institute of Technology, Modern Builders Conference**, Prudential Building, Chicago, Ill., Dec. 6-7.

**American Society of Heating and Air-Conditioning Engineers, annual meeting and 13th International Heating and Air-Conditioning Exposition**, The Conrad Hilton Hotel and International Amphitheater, Chicago, Ill., Feb. 25-Mar. 1, 1957.

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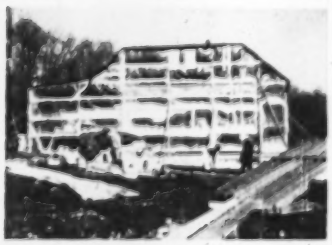

The work goes on at top efficiency even in bad weather when you close in with Olin Polyethylene.

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Whether it's used as a moisture barrier, protective cover, curing blanket, or closing-in material, Olin Polyethylene will usually save you time, labor and do the job better.

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# "First time I ever used Armco Piling ...but it drove fast and straight"

So said Mr. F. R. Brown, project superintendent for H. G. Smith, contractor of Fitzgerald, Georgia. He was speaking in regard to Armco Welded Steel Pipe Piles that were used in replacing three county bridges on Georgia's State Route 119.

All three bridges, totaling 1500 feet in length, utilize the same basic design —bents consisting of four Armco Pipe Piles capped by a concrete beam. The two outside piles were driven on a 1½ to 12 batter while the center two piles were vertical. All of the piles were driven with a drop hammer on fixed leads.

### Armco Piles Have Many Applications

Armco Pipe Piles are economical and efficient for bridges on superhighways as well as county roads. They are also widely used for foundations of buildings and other structures. You will find the right wall thickness, diameter and length for every foundation job.

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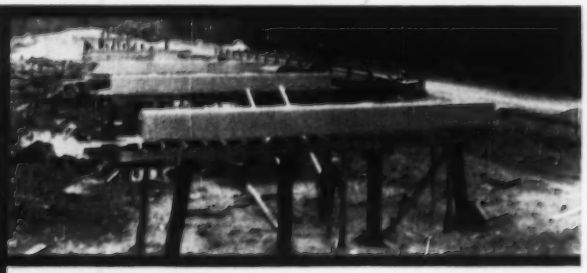
**Bridge No. 1** Armco Pipe Pile bents are almost completed for this 389-foot bridge. Old bridge at right.



**Bridge No. 2** Armco Pipe Piles are ready for next step in building this 683-foot-long bridge. Note old bridge.

**Bridge No. 3** As with the other bridges, this 424-foot-long structure has outside piles driven on a batter.

Contractor: H. G. Smith, Fitzgerald, Georgia

Georgia State Highway Department:
Resident Engineer, L. B. Ackerman
Project Engineer, J. I. Moore

ARMCO
PIPE PILES

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# ENGINEERING NEWS-RECORD

Vol. 157, No. 11 September 13, 1956

Number of copies printed this issue: 75,230


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# THE CONSTRUCTION WEEK

**WHAT FORM OF PARTNERSHIP**—In the last session of Congress a partnership bill for construction of John Day Dam on the Columbia River failed to get anywhere. The ill-fated bill called for unspecified "partners" to put up $273 million to cover power phase costs and the federal government to foot the rest of the $310 million bill. Now Klickitat County Public Utility District in Washington State has applied to the Federal Power Commission for a preliminary permit to investigate the project. There is no hint of financial arrangement. But partnership still looms strongly—the PUD reportedly has inquired into the possibility of utilizing the Corps of Engineers as its construction agent. At present the Corps is completing design under a $2 million appropriation. And until the situation is changed by partnership legislation, John Day remains a federal project.

**LOCAL SHOPPING**—With little action on the national scene, subcontractors continue to push their claims for independent bidding on local levels. Latest evidence comes from Cleveland City Councilman James J. Lavingston, who announced he would introduce legislation to permit subs to submit bids directly to the city, by-passing the general contractors. Said Lavingston, in a vein not unfamiliar to construction men: Prime contractors are shopping around and putting the squeeze on subs. Result is inferior work on city jobs.

**PLAYING SAFE?**—Niagara Mohawk Corp., spending $4 million to rebuild part of its demolished Schoellkopf Station below Niagara (see also p. 28), and not yet counted entirely out of the water-power picture at the Falls, said last week it will build a $75 million steam-power station in the area. The announced plant would bring the company's total capacity, hydro and steam, to 3,550,000 kw.

**OUNCE OF PREVENTION**—The snowballing trend for construction firms to set up separate engineering divisions has been dealt a blow in Kentucky. To prevent any firm from acting in the dual role of consultant and contractor, State Highway Commissioner Bert Kiser has stated that firms accepting commissions for surveys and planning of roads will not be accepted as bidders for their construction. Says Kiser: "We do not propose to commission consulting engineers to represent our interests in the planning of highways and at the same time—to represent their own interests as contractors."

# SECOND BEST!

## Only when the perfect pipe is invented.

The dream pipe for which all engineers pray would be light as a feather, indestructible, pliable enough to bend around obstructions, and would be installed by a magical machine that digs the trench and extrudes, lays and backfills the pipe.

Needless to say, this will be in the far distant future. Until such a dream pipe is invented, water works officials and engineers are specifying the next best pipe—LOCK JOINT CONCRETE PRESSURE PIPE. It comes the closest to realizing their ideal specifications: long life at top carrying capacity because it never corrodes nor tuberculates; great strength to withstand internal pressure and exterior loading; versatility to meet the most difficult laying conditions, and minimum maintenance requirements over the years.

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## WASHINGTON OBSERVER

**More lenders and builders are tapping FNMA as a source of credit.** They are doing this by selling their FHA and VA mortgage paper which makes it possible for them to turn around and lend their money again.

**Highest total of mortgages offered** since the secondary market operation got underway 22 months ago was reached during the week of Aug. 27. More than 2,000 mortgages were offered worth $23 million.

**Actual purchases lag behind offerings by 4 weeks or so.** But purchases last week edged toward the $10-million mark. FNMA bought $9.25 million, and officials know the weekly rate will keep climbing.

**Sellers have a new incentive** in that, for the past month, they have had to put only 2% of the proceeds into FNMA stock; heretofore they had to invest 3%. However, FNMA buys at a substantial discount; its price is attractive only when money is extremely tight.

**All told, Fanny Mae has bought $330-million** worth of mortgages since the program started. In addition, $56 million has been approved but not yet purchased.

•

**Construction job opportunities are on the upswing.** This fact stands out above all others in the Labor Dept. summary—for the first half of this year—of its new monthly reports on the characteristics of the unemployed.

**Construction workers comprised only 7% of the unemployed** as of June, down from 24% of all the nation's jobless as of January. Part of this rise in construction jobs is, of course, seasonal, but labor spokesmen say not all of it is. One interesting note: Nearly half of the 80,000 unemployed construction workers in June were unskilled—a trend which is rising in other industries, too. Among the skilled workers drawing unemployed pay, most were carpenters, followed by plumbers and painters.

•

**Congressional Sub-Committee on Highway Safety** is gathering information around the country. The House Interstate and Foreign Commerce group, headed by Rep. Kenneth Roberts (D., Ala.) is trying to complete an investigation of their own to determine what deficiencies in law, law enforcement, vehicles, and highway design are responsible for the high accident rate. Interstate Commerce Committee has the same interest and jurisdiction in highway matters of this kind as does the Public Works Committee which authorized the highway construction program.

**The committee has to report by the year's end** when its authority expires as the new Congress comes in.

**Bureau of Public Roads hopes to use** some of this material in its own study of the same subject (see page 26).

•

**Engineer shortage in government agencies is getting top-level attention.** The government as a whole is concerned that the shortage is hurting the defense effort. Chiefs of Civil Service Commission, Office of Defense Mobilization, Budget Bureau and high-ranking officials of Defense Department, Atomic Energy Commission, and National Advisory Committee for Aeronautics are getting together to see what can be done.

**One idea is to give agency heads more leeway on salaries** in filling engineering spots. For instance, they might give highest salary permitted for a given job right at the outset, rather than require a new man to move up to top salary over a period of years. It would have the effect of boosting engineer salaries across the board.

# TEAMMMMED TO OUTPERFORM

## IN EVERY AUSTIN-WESTERN POWER GRADER

Power in the front drivers makes it safe to work along the top of a steep bank.

The teamwork of All-Wheel Drive and All-Wheel Steer makes the grader as sure footed as a mule.

Working upgrade on hairpin switchbacks is easy for the A-W grader.

## All-Wheel Drive, All-Wheel Steer work together . . . doing things impossible for ordinary graders

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All-Wheel Steer makes Austin-Western graders twice as maneuverable as those with front steer only; steering that lets you "swing that rear-end" for handling every job with maximum efficiency.

All-Wheel Drive for maximum mobility and 30 percent more Power-at-the-Blade—power that is made still more effective by Torque Converter drive. All-Wheel Steer for extreme maneuverability. Put them together and you have teamwork that keeps Austin-Western Power Graders working where other graders fail. Austin-Western Works, Construction Equipment Division, Baldwin-Lima-Hamilton Corporation, Aurora, Illinois.

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*". . . Improvement of the economic strength and welfare of American workers has been one of the main objectives of the Administration."*

*"It is time to start thinking again . . . in terms of people . . . of a new America . . . where poverty is abolished."*

# For Them—Labor's Vote Is Quantity X

by Charles J. Harding
Associate Editor

Ever since AFL-CIO President George Meany clashed over politics last December with Charles R. Sligh, Jr., then board chairman of the National Association of Manufacturers, the political power of labor under the new federation has been a $64 question.

At that time, Sligh expressed the fear that the AFL-CIO could "direct the destinies of the nation" by pulling strings behind the scenes and become a "ghost government."

So far, the answer looks like the same one which Meany gave when the AFL-CIO was formed: "We know that no one controls the votes of the American people, we don't pretend to control them and we don't care what party people come from. We want to educate our people to vote intelligently . . . for candidates with sympathy for the aims and aspirations of the great mass of workers."

Only an optimistic Republican or a pessimistic Democrat, however, would write off as ineffective the labor endorsements of Stevenson. Like any form of brain-washing, the endorsements are injecting the party label with all its emotional trappings into the otherwise non-partisan approach of the AFL-CIO and will undoubtedly make many politicians wish it weren't so difficult to split a ticket at the ballot box.

Myth though it is because of labor's composition, the "labor vote" has tossed both the Republicans and the Democrats into a tough campaign of psychological warfare, with particular emphasis on "human values," from which labor itself will be the biggest victor.

Whether "to the victor belongs the spoils" holds true will depend upon how many candidates friendly to labor are elected in November and how they cast their votes as councilmen, assemblymen, congressmen and senators on the various issues close to the heart of labor.

Within the last few weeks, Stevenson's dream of a "new America, where poverty is abolished and our abundance is used to enrich the lives of every family" has had a persuasive appeal to many in the AFL-CIO, particularly to those in the old CIO, to whom that language means more than "peace, prosperity and progress" to which President Eisenhower is dedicated.

But it's generally conceded that the Stevenson endorsements won't carry a heavy charge because the ultimate decisions in November rest with individuals whose interests and problems and political convictions, even within labor itself, defy a common mold.

• **AFL-CIO endorsement**—Perhaps the clearest demonstration of this in recent weeks has occurred within the AFL-CIO itself, and particularly within the building trades whose President, Richard Gray, publicly supported Eisenhower in 1952.

When the federation's Executive Council met on Aug. 27 in Forest Park, Pa., for example, the recommendation that the AFL-CIO endorse the Stevenson-Kefauver ticket was made without unanimity and only after hours of debate. Among the patent obstacles to the Walter Reuther drive for Stevenson were these: The non-partisan approach which Meany has consistently preached; the Gompers' philosophy of "rewarding friends and punishing enemies"; the personal convictions of council mem-

**James P. Mitchell,** Secretary of Labor

***"The level of the economy was never higher in peace or war."***

***"More are gainfully employed than ever before."***

***"They are earning higher wages and they are able to buy more."***

***"Our responsibility: . . . to make the American dream a reality."***

bers like Dave Beck (teamsters) and Maurice Hutcheson (carpenters) whose sympathies are known to be Republican; and the fact that the old AFL had come out for a presidential candidate only twice before in history—LaFollette in 1924 and Stevenson in 1952.

Out of the 22 members who voted, Beck, Hutcheson, Harry Bates (bricklayers) and Charles MacGowan (boilermakers) were among the eight who opposed endorsement of any kind. Beck, Hutcheson and Bates were among the five who opposed the endorsement of Stevenson. At the same time, Joseph Keenan (electrical workers) favored both the idea of endorsement and the selection of Stevenson.

This week the recommendation is before the AFL-CIO General Board. Its acceptance of the recommendation, according to Meany, is a foregone conclusion.

But Meany has been careful to point out that such an endorsement is an endorsement of the Democratic presidential and vice presidential candidates only, not of the Democratic party. Said Meany: "I don't consider this attaching ourselves to any party."

Even Reuther, whose political victory in the AFL-CIO may later plague the federation, has agreed that endorsements of local candidates are "local decisions" which the people make locally" on the basis of voting records and the positions of their parties on basic issues.

• **Reactions**—This feeling of autonomy and individual freedom is particularly evident in the building trades. Sal Maso, who is president of the New Jersey State Building and Construction Trades Council and who attended the Republican Convention, says that "the laboring man will accept advice and guidance, but he thinks and acts for himself."

Additional indications of current feelings are these:

• Dave Beck, president of the teamsters: "I am personally of the opinion that the AFL-CIO should not endorse. That question should be left to the individual international union . . . the Administration has done a splendid job."

• Charles Aquadro, president of the roofers: "Officially, the union does not endorse or support either Eisenhower or Stevenson and it has not expressed any preferences obviously, endorsement by the AFL-CIO will carry some weight in the election but just how much is the big question."

• Maurice Hutcheson, president of the carpenters: "We will not endorse either candidate. The members of this union have the right to vote as they please. They can vote their convictions, and, thank God, that's the way it is."

• William Calvin, president of the boilermakers: "This brotherhood will not become tail of any political party's kite. We will never tie ourselves to either party but will endorse individual candidates for Congress, depending on their record, not their party affiliation."

• **COPE**—Actually, Calvin's statement closely reflects the political approach of the AFL-CIO.

In commenting on the endorsement of Stevenson, for example, the AFL-CIO said "the Stevenson-Kefauver ticket was endorsed because the Executive Council considered that on the basis of the candidates, platforms and records, a victory for Stevenson and

Kefauver would be good for labor and good for the people of the whole nation."

According to Meany, "the challenge to labor is in the legislative halls. Our answer is political education and activity."

The AFL-CIO agency for conducting that activity is its Committee on Political Education, which is bound by the AFL-CIO Constitutional Convention mandate of "supporting worthy candidates regardless of party affiliation."

Through legislation, labor seeks to protect and improve the gains it has made and to secure greater economic prosperity, security and equality of opportunity for all workers. "We cannot hope for enactment of truly liberal and public-interest legislation," Meany has said, "until we elect a sufficient number of senators and congressmen not dominated by selfish pressure groups and dedicated to the public interest."

Supported by voluntary contributions from union members with a goal of $1 from at least 25% of the 15 million AFL-CIO membership, COPE vigorously encourages voter registration and reports "facts" about issues and candidates so that AFL-CIO members will "vote intelligently." It makes no endorsements itself, but its local agencies do.

It has already sent out for ultimate distribution by mail to every AFL-CIO member an analysis of the voting records of all candidates for office on the national level. Similar work is being done by local agencies on candidates for municipal and state posts.

The voting records cover most of the issues of interest to labor, ranging from minimum wages to foreign aid and covering such items as the Taft-Hartley Act, unemployment and workmen's compensation, housing, hospital and school construction and tax cuts. The candidates' votes are tabulated as "right" or "wrong," enabling the voter to determine whether the candidates are "friendly" to labor.

COPE co-director James McDevitt estimates that perhaps 25 Republican congressional candidates will win local COPE endorsements. All senatorial candidates are apt to be Democratic.

To supplement this work, COPE is taking off the press this week a "Speakers Handbook of Facts," which explains the issues and what position the AFL-CIO has taken. The booklet parallels the detailed statement which the AFL-CIO earlier submitted to the platform committees of the Republican and Democratic Conventions.

The United Mine Workers, of which the United Construction Workers is an integral part, is doing substantially the same thing. It has endorsed 45 candidates in 17 states all senatorial endorsements are on the Democratic ticket.

Seven congressional endorsements are on the Republican ticket. But even here the UMW and AFL-CIO don't agree—they've endorsed opposing candidates, for example, from Kansas' Third Congressional District.

The AFL-CIO is up against the same problem in its own ranks. The building trades are realists and have no direct interest in some of the fields in which the AFL-CIO takes an active interest, such as foreign affairs and farm price supports. Thus COPE may give the political ax to a "friend" of the building trades because of his record on things those unions aren't interested in. A case in point is Thomas Kuchel, Republican senator from California, who was largely responsible

**Walter P. Reuther,** President, Industrial Union Dept. AFL-CIO

*". . . Economic gains can be lost by a failure to act politically."*

*". . . Statistical optimism doesn't take care of . . . unemployment."*

*"Slogans have taken the place of performance."*

*". . . The great crusade never left Madison Avenue."*

for getting the prevailing wage provision in the highway bill and who is generally considered a "friend" by the building trades.

He was scored with a preponderance of wrongs and the local endorsement went to his opponent.

• **Issues**—Even on specific issues of mutual interest, the same situation occurs.

Of particular concern to the building trades are:

• Taft-Hartley amendments—legalization of pre-hire contracts; changes in the secondary boycott provisions; elimination of the mandatory injunction provision; and repeal of Sec. 14 (B) which supports right-to-work laws.

• Modernization of Davis-Bacon—extended coverage to include all federally-assisted construction; incorporation of fringe benefits in prevailing wages; centralization of enforcement.

• Housing—A public housing program embracing construction of two million housing units a year with realistic credit policies that allow VA and FHA mortgages to compete favorably in the money market.

Although the AFL-CIO goes along in substance with the building trades on Davis-Bacon and housing, it has failed to flag the critical credit issue, which is viewed with as much alarm by construction workers as it is by homebuilders. And on the Taft-Hartley issue, the AFL-CIO does not specifically support the building trades' requests. It merely asks for an "overhaul" of the law "on a fair and workable basis," with elimination of right-to-work laws which are considered a threat to union security. Thus its position becomes an unknown quantity. Some attribute the generality of the AFL-CIO approach to the still unsettled jurisdictional conflict between craft and industrial unions.

Except for the different approach to the Taft-Hartley Act, the political platforms offer labor little assistance in their ballot-box decisions. Most of the labor issues are covered in both platforms with glowing promises of marked similarity. But as to the Taft-Hartley Act, the Republicans would amend the law, giving the construction industry special consideration along the lines suggested by the building trades, except for repeal of right-to-work laws. The Democrats, perhaps because Vice President Thomas Kennedy of Lewis' UMW which wants repeal was on the platform committee, would repeal the law and start all over again. In doing so, they would eliminate right-to-work laws, which, ironically, are predominately Democratic states.

• **The decision**—Thus the voters are thrown back upon what they think the candidates have done and will do, and upon their personal feelings as to what the parties stand for.

On the presidential level, however, there is no uniform evaluation by labor of the record of the Eisenhower Administration. In the building trades, bulk of the criticism is Eisenhower's "failure to fulfill his pre-election promises to labor," with particular reference to housing, education, tax cuts and Taft-Hartley amendments.

The unparalleled prosperity of working people is generally conceded, but Meany, for example, claims we have this prosperity in spite of, not because of, the Republican party.

At the same time, some labor leaders subscribe to the prosperity views of Secretary of Labor James P. Mitchell, who said: "I don't think the AFL-CIO endorsement will have a great effect on the vote. I believe the workingmen of the nation are going to vote for the Eisenhower Administration, which has given them a high level of prosperity, real wages, jobs and other benefits."

Others are quick to point out that Democratic obstructionism in Congress has had a lot to do with the Eisenhower record. Loyd Mashburn, president of the lathers union, former undersecretary of labor and an Eisenhower supporter, shares Beck's views that the administration has done a decent job and has supported the AFL-CIO on principal labor issues. He has "more criticism" of southern Democrats than of Republicans. Incidentally, during the 84th Congress, whose record Meany describes as a mixture of good and bad, the strategic House and Senate labor committees (predominately Democratic in membership and where many bills labor wanted died) were headed up by southern Democrats: Barden of North Carolina and Hill of Alabama.

But when the voter moves away from the "record," he enters the quicksands of intangibles where Stevenson endorsements will doubtlessly be most effective. For specific actions and promises with respect to such things as unemployment and workmen's compensation, public housing and Davis-Bacon and Taft-Hartley amendments are apt to be less persuasive to many voters than the brainwashing of general concepts, slogans and party philosophy with emotional appeals.

Despite labor's avowed nonpartisan approach to politics, the Stevenson endorsement is bound to slant campaign talk in terms of the welfare of human beings and to affect to some degree ballot decisions all the way down the line.

**Accuser . . .**

**Gov. George Leader claims to have evidence of multi-million fraud**

# Sparks Fly or

Gov. George M. Leader's long-standing guerilla action against the Pennsylvania Turnpike Commission erupted into open warfare this week. The governor flatly charged fraud amounting to more than $9 million, and state officials appeared in courts to ask for appointment of a special grand jury to investigate the charges. A grand jury proceeding was ordered by the court on Monday.

As presented to the Dauphin County (Harrisburg) court by Attorney General Henry P. Cohen, the state minutely documented its claims of fraud, it named an engineering-contracting firm, a former commission chairman, and various commission employees past and present—as having committed illegal activities. Final court action on calling a grand jury is expected this week.

But the final eruption of the charges brought to light two points of major interest to the construction industry:

• Basically, the fight is a political one.

• But it is also an all-out attack on the entire theory of commission or authority financing and operation of public works.

• **Political side**—The political angle in the fight is clear enough. Leader—

**Defender . . .**

Thomas J. Evans defends actions as legal, legitimate

# Penn Pike

the state's first Democratic governor in many years—isn't up for election at the November voting. But his party is fighting hard to gain the U.S. Senate seat now held by Republican former Governor James H. Duff, and for many important state and city posts.

## • Political Scandal

Thus any political scandal that can rebound to the discredit of former administrations—such as the present charges of long-standing malpractice on the part of the commission, its contractors and employees—can be turned into political capital. Additionally, the commission employs several hundred people—a nice addition to the state's patronage list.

There's another angle, too—and Governor Leader isn't alone. Officials of such a group as the Turnpike Commission are virtually untouchable by the elected officials of the state (in many cases they are appointed for definite terms, and not removable except on charges of misfeasance or malfeasance). Existence of such a powerful body, with power to employ and to spend huge sums, has been a thorn in the side of many a politician.

• **Finance side**—But the angles in the attack on the authority or commission method of financing public works aren't nearly as clear, though they add up pretty well out of what has transpired in Pennsylvania.

The governor has registered his opposition to this form of financing and operation several times—most recently when he announced that he hoped that the state could get federal credit (under the new highway bill) for the turnpike, use the money to pay off bondholders and free the road to become a part of the state's highway system.

He opened his campaign against the commission some months ago with an investigation into the affairs of the Delaware River Joint Commission, which (with part of its membership from New Jersey) operates several crossings between Pennsylvania and New Jersey.

## • Charges by Governor

That investigation also began with charges by the governor of various forms of fraud, padded expense accounts and the like, resulting in dismissal or resignation of several commission members and employees, and some court action now pending.

The governor, and some economists, have contended that a straight financing by the state would have resulted in lower bond charges—hence lower tolls—and lower maintenance, engineering and other costs than have come out of the commission form of operation.

• **Complications**—A number of legal and other complications would seem to be roadblocks in the governor's intention to abolish the commission and others like it.

In the case of the Delaware River Joint Commission, this is a two-state (with New Jersey) compact, and could not be abolished unilaterally by either state.

Additionally, such compacts must be approved by Congress, and legal opinion is that Congressional approval would have to be obtained to dissolve them.

In the turnpike case, there is serious doubt that the new federal highway law will permit use of federal funds to pay off bondholders on what has been a private venture. In fact, the new law was purposely left vague on the matter of state credits for previously-built toll facilities, pending a three-year study and report by the Bureau of Public Roads. (In Illinois, Charles L. Dearing, executive director of the State Toll Highway Commission, in a special report to the commission, said:

"There is no feasible way of dissolving the covenant between the . . . commission and its bondholders, nor can federal money be used to 'buy up' the project . . .").

And there is considerable doubt that the money markets would accept direct state obligations as readily as they have those of the Turnpike Commission.

Also, there has been no court test of the state attorney general's opinion that the Turnpike Commission has no business but policing and collecting tolls on the 360-mile turnpike—an opinion under which the State Department of Highways has already started to take over planning, acquisition of right-of-way and maintenance, from the turnpike.

• **Specific charges**—Both in a prepared statement released to the press by the governor's office, and in the petition submitted to the court last week, the state administration singled out by name two principal targets—Thomas J. Evans, who resigned in July, 1955, as chairman of the Turnpike Commission, and the Mann-Mine Research & Development Co. of Reading.

In his petition to the court, the Attorney General specifically charged Mann-Mine with "intent to defraud the commonwealth of nearly $20 million, of which $9,064,241.42 already has been paid." Principal officers of Mann-Mine—some of whom are relatives (either directly or by marriage) of Evans—and a number of past and present commission employees are specifically named in the petition.

## • Statements to Press

In statements to the press, both Evans and the Mann-Mine concern flatly denied the charges, Evans contending that every contract negotiated in his tenure as commission chairman was legitimate. The Mann-Mine concern, in a prepared statement issued in the name of Charles W. Stickler, Jr., president, denied the governor's charges as "ridiculous" and called them "a clear expression of the malicious and vindictive tactics" of the state administration.

Mann-Mine has lawsuits pending against the state for amounts of more than $1 million, as result of cancellation of contracts it held on work on the northeast extension of the Turnpike, which involved filling of old mine workings under the right-of-way, in an effort to prevent settlement.

Other commission employees were accused of accepting bribes, with participating in fantastic deals with auto dealers involving sale and repurchase of commission-owned cars, with doing work for private individuals at commission expense, and the like.

Five study groups set up, deadlines made as . . .

# BPR Tackles Grand Plan Problems

Within the next 15 to 30 months, the Bureau of Public Roads is expected to come up with answers to highway problems that have plagued engineers and economists for years.

Congress ran headon into the perplexing problems while working out the accelerated construction program embodied in the Federal-aid Highway Act of 1956. Baffled by the lack of information on which to base final decisions, the legislators accepted compromise solutions and called on the bureau to fill rush orders for factual reports on five critical issues.

## • Tough Assignments

All five studies are stiff assignments, as BPR Commissioner C. D. Curtiss made clear last week in a talk at Roanoke, Va., to the annual meeting of the Southeastern Association of State Highway Officials. The tasks range in difficulty from the immediately urgent job of making an accurate estimate of the cost of completing the interstate system, to a complex study that covers not only the cost of providing highways for different classes of vehicles but also the benefits derived from the same highways by both users and non-users.

The bureau's report on interstate construction cost is due in January 1958. Three states already are testing the method of making the cost estimates (ENR, Aug. 30, p. 19), and all state highway departments will be at work on their individual interstate estimates by November. Beginning in 1960, federal interstate funds will be distributed among the states on the basis of these cost estimates.

For the complicated analysis of broad-based highway benefits and costs—the incremental study, as it is popularly known—BPR has a scant 30 months to make a final report. The findings must be submitted to Congress by the Secretary of Commerce no later than March 1, 1958. Purpose, of course, as the law plainly states, is to help the legislators make "an equitable distribution of the tax burden among the various classes of persons using the federal-aid highways or otherwise deriving benefits from such highways." Two interim progress reports are called for, the first by next March and the second by March 1958.

Similar fast schedules are set by the legislation for three other studies requiring a vast amount of fact finding and evaluation. The earliest of these, due in January 1958, will assist Congress in determining "whether or not the federal government should equitably reimburse any state for a portion of highway which is on the interstate system, whether toll or free." To be considered, the roads must measure up to interstate standards and must be constructed between 1947 and 1957. The interstate system, including toll turnpikes that have been promoted for parts of reimbursement possibilities add up to several billion dollars.

## • Up to Standards?

The bureau first has to determine which highways meet the interstate standards and then, in addition, give Congress the results of a complete study of all factors of "cost, depreciation, participation of federal funds, and any other items relevant thereto." Curtiss hopes that the states have their road life studies in good shape to ease the task. Even so, he says, figuring the depreciation of grading, surfacing and other items will be a big job.

Even more difficult will be the exhaustive study required to give Congress the recommendations it asks for on the maximum desirable weights and dimensions of vehicles. The language of the law might seem to imply, Curtiss noted, that the American Association of State Highway Officials road test project now under construction in Illinois would supply the answers—even as early as March 1, 1959, when Congress wants them.

But the Illinois test, he explained, has limitations. When completed, it will show "what pavement structure is required to support specific axle loads of known frequency." For the federal-aid systems, however, highway engineers will need much more information than they now have on the magnitudes and frequencies of axle loads to be expected. And, to determine desirable axle loads, Curtiss said, it is necessary to know not only the road cost but also the vehicle cost for vehicles of various weights and sizes, in order to arrive at the lowest total cost. Fortunately, a study of vehicle cost by the Highway Research Board's Committee on Economics of Vehicle Size and Weight is well along toward completion. It will contribute importantly to the bureau's analysis and recommendations.

A fifth important study, to determine what the federal government can do to increase highway safety, was added to the bill as Congress approached final agreement on the measure. This study, to be reported by March 1, 1959, calls for findings and recommendations on how safety can be promoted in the manufacture of vehicles, in the design of highways, and through educational programs or other means. It also asks for advice as to the possible benefits of uniform safety and speed laws and the need for federal assistance in enforcement.

BPR expects its study to complement a similar investigation already begun by a Special House Subcommittee on Highway Safety, headed by Rep. Kenneth A. Roberts (D., Ala.), Curtiss said. The bureau will make such use as it can of the committee's findings in planning its own study. Sure to be included, however, are a pilot study of the real causes of accidents and an investigation of the effect of speed and horsepower in producing accidents.

## Deadlines for Completion of Studies

| | |
|---|---|
| **January 1958:** | **A more accurate cost estimate of interstate system—present rough estimate is $27- to $28 billion.** |
| **January 1958:** | **Re-imbursement to states for roads meeting 1975 standards—billions are sought by states with such highways.** |
| **March 1959:** | **Cost of building roads to meet demands of types of users—additional costs to cope with heavy trucks, etc.** |
| **March 1959:** | **Maximum sizes and weights of vehicles—recommendations to Congress fixing desirable axle loads, vehicle sizes.** |
| **March 1959:** | **Design for traffic safety—findings on causes of accidents and their bearing on road construction.** |

## The Race Is On

### States are moving to get funds to start highways

Jockeying for position and applications for additional mileage under the Federal Highway Bill continue this week to hold the roadbuilding spotlight.

Announcement was made that the California Highway Commission has added $63,545,000 to the state's highway budget, thus marking the initial effect of the federal aid highway program in that state. Of the additional funds, $47,245,000 have been earmarked for right-of-way acquisition and $16.3 million for construction, some of which is slated for contract letting within a few months.

California's portion of the federal aid fund has been set at $142 million for the 1957-58 fiscal year and big emphasis has been put on right-of-way in the first allocation to clear the way for construction in succeeding years.

Largest project for which construction funds from the federal revenue source have been voted is the Los Angeles County Harbor Freeway, $6 million.

It will involve grading, paving and structures for 8 lanes of freeway 2.8 mi in length. Another $2.75 million was voted for the Long Beach Freeway in Los Angeles County. Right-of-way money includes about $7 million for Los Angeles County, $4.4 million for Contra Costa County and $4.5 million for Orange County.

In Kentucky, 24 civic, commercial and engineering groups have endorsed proposal of a $100-million bond issue that will go before taxpayers on November 6. The bond issue, which would make the funds available for matching federal road construction grants, has been promoted by the Kentucky Better Roads Council, a non-partisan organization of civic groups and leaders.

### Availability of U. S. Funds Slows State's Bridge Plans

Availability of federal funds for highway purposes has slowed plans for four bridges near Hartford, Conn., while state officials debate whether the new money will make it cheaper for the state to build the structures.

The Hartford Bridge Authority—created a year ago, before passage of the new federal highway bill planned to build four bridges over the Connecticut River connecting Hartford and East Hartford. The new structures would be toll bridges. In addition, tolls were to be established on the century-old Bulkeley Bridge and the present one-cent commutation charge on the Charter Oak Bridge would go up to five cents.

But when the bridge authority went to Gov. Abraham Ribicoff last week with a request for $500,000 for purchase of steel piles for the first of the new structures, Highway Commissioner Newman E. Argraves objected. He said that with federal funds now available to the state, the new bridges could be built more cheaply—and as free structures.

Mindful of an estimated 20-year saving of more than $40 million to motorists if the bridges are free, the governor took the matter under advisement pending further study.

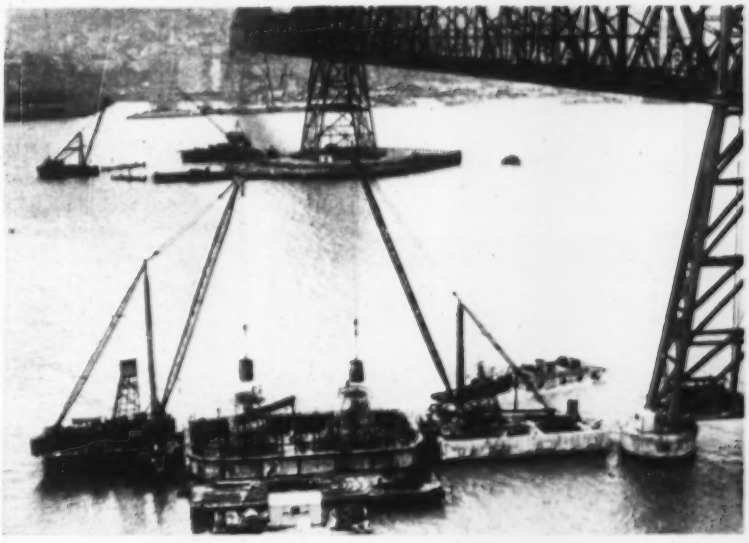
### FPC Upheld Against State Effort to Stop Hells Canyon

An Oregon circuit court judge has ruled that "no state can exercise . . . a veto power against the action of the Federal Power Commission, acting under the Federal Power Act."

This opinion of Baker County Circuit Judge F. L. Hubbard dismissed an indictment against Idaho Power Co. charging the investor-owned utility and its officials with flouting the Oregon Hydro-Electric Commission, which required a state license for the company's Brownlee Dam on the Snake River (ENR Aug. 30, p. 27).

Judge Hubbard said "the (FPC) license granted is paramount over the laws of the state of Oregon for the construction and operation of the dam."

His ruling appears in consonance with interpretations over the past 15 years, which have extended federal jurisdiction to non-navigable tributaries of navigable streams.



## Caisson Concreting Begins at Carquinez

**Some 690 cu yd of concrete have been placed in the initial big pour for the first of three caissons slated for the substructure of the second Carquinez Bridge.**

**The 53 x 103-ft caisson has 18 cells separated by thick concrete walls. Concrete is barged to the caisson in bucket and hoisted to a special distributing machine by pile-supported derricks.**

**The bridge, which will cross an arm of San Francisco Bay, is a bond-financed toll structure of the California Division of Highways (ENR Dec. 15, 1955, p. 45). Contractor on the $5.5-million substructure is Mason & Hanger—Silas Mason Co., Inc., and F. S. Rolandi, Jr., Inc.**

### ARBA Sets up Information Group on Photogrammetry

In a move to provide widespread information quickly on latest developments in photogrammetry—seen as a manpower saver in the nation's highway construction program—the American Road Builders' Association last week announced formation of a new technical committee.

Heading up the new committee will be William C. Cude, chief of the Army Topographic Engineering Department at Fort Belvoir, and president of the American Society of Photogrammetry.

Among the duties of the new group will be preparation of reports on accomplishments of the method and on the latest developments by manufacturers of equipment utilized in the work.

# Road Funds Needed

## Governor seeks gas tax increase in New Jersey

Gov. Robert B. Meyner will ask the New Jersey legislature next week to raise the state gasoline tax from four cents to five cents to help finance the state's share of a $2.5-billion, 13-year highway program.

Leaders of the Republican-controlled legislature have said they will investigate other methods of financing the road plan. But privately they concede they probably will approve the gasoline tax increase.

The additional road funds are needed; according to state Highway Commissioner Dwight R. G. Palmer, to prevent the state from accumulating a $500 million deficiency in its highway system during the next 13 years.

Palmer points out that New Jersey will receive about $1.5 billion in federal funds during the next 13 years. New Jersey will add $342 million in matching funds and will spend another $130 million for state roads not included in the federal-aid program.

That adds up to slightly less than $2 billion—about $500 million less than the amount needed just to match the state's road requirements during that period, according to Palmer's estimates.

• **Bond issues out**—Governor Meyner has said that these figures make it obvious that additional road funds will be needed. He feels that toll roads are not the answer.

"With the New Jersey Turnpike and Garden State Parkway already in operation, we might expect diminishing returns from any similar projects in the future," Meyner commented.

He also rejected as "totally unacceptable" a proposal for a $300-million bond issue.

Meyner criticizes bond issue proposals on the grounds that: "We would not only have to put out the money to build the roads, but we would also have to pay . . . the interest on the bonds and interest rates are increasing."

• **Major projects**—Highway commissioner Palmer listed eight interstate highways in New Jersey that are slated for major improvements. They include Routes 1, 3, 22, 46; a new route from Suffern to U. S. 1 at Woodbridge, via Morristown, and a new highway that runs from Trenton to the Delaware Memorial Bridge at Deepwater.

Two short connecting routes also are included in the interstate system. They are: a link from the Goethals Bridge at Bayway to Route 22, and a link between the new Trenton-Deepwater route and the Camden-Philadelphia bridge.

The overall plan includes construction of urban freeways, dualization or widening of many existing routes, construction of overpasses, modern interchanges, wide shoulders, acceleration and deceleration lanes, and crash barriers.

## Niagara License Requested; FPC Lawyers Go Into Huddle

The Power Authority of the State of New York finally resubmitted its application for license to develop water power available at Niagara Falls last week. And the Federal Power Commission had reportedly turned over the application to its law division for a ruling on its jurisdiction over the treaty-bound, international waterfall (ENR Aug. 16, p. 25).

The State Power Authority made good its threat to contest Congress' hold on the wasting water power at Niagara by asking FPC for a license in spite of the 1950 treaty with Canada in which the Senate reserved to Congress the right to determine who should build the needed power facilities below the Falls. A court fight seems inevitable.

In its application to FPC the State Power Authority asks the right to make use of water now licensed to Niagara Mohawk, subject to discussions with the company. Whether consent of Niagara Mohawk will be forthcoming is in doubt inasmuch as the company is launching into the rebuilding of Section A of the Schoellkopf Station, demolished by a rock slide in the spring (ENR June 14, p. 27).

# New Bridge Outmodes Another Bay Ferry

Oddly distorted to the camera's eye is the 21,343-ft double-deck Richmond-San Rafael Bridge across the northern arm of San Francisco Bay. The new crossing was opened for traffic Sept. 1.

The structure has three lanes of traffic on its upper deck—now open—and will carry an additional three below. Connection to the lower deck was just being completed when the picture was taken.

The $68-million structure (ENR March 29, p. 42) contains two cantilever spans, each 1,070 ft long, to clear two navigation channels. It was built for the California Toll Bridge Authority by Judson Pacific Murphy-Kiewit, contractors. The new bridge will replace another bay ferry route, the ferries seen at left.

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# PENETRATION

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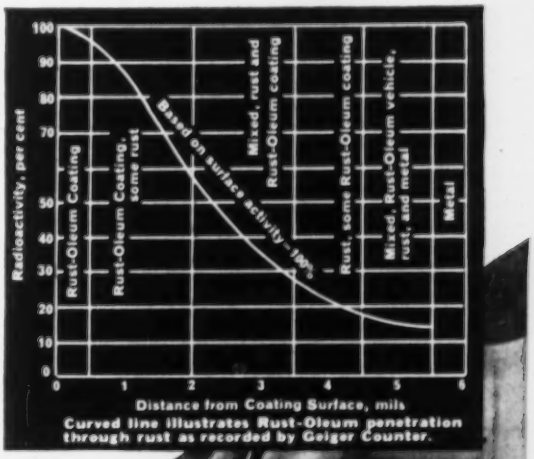

Curved line illustrates Rust-Oleum penetration through rust as recorded by Geiger Counter.

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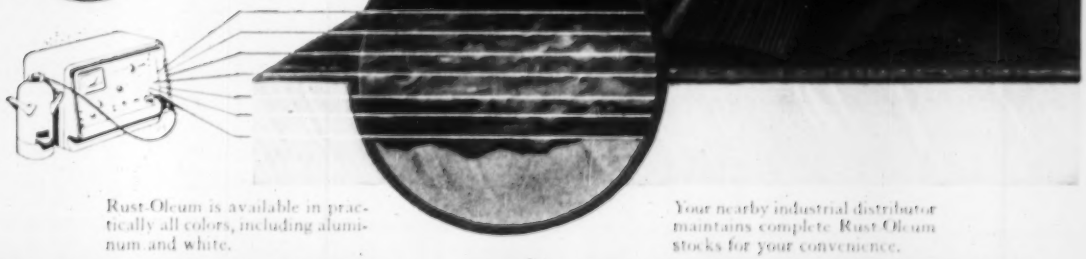

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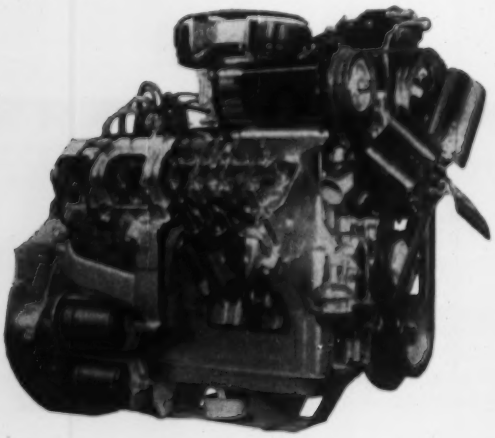

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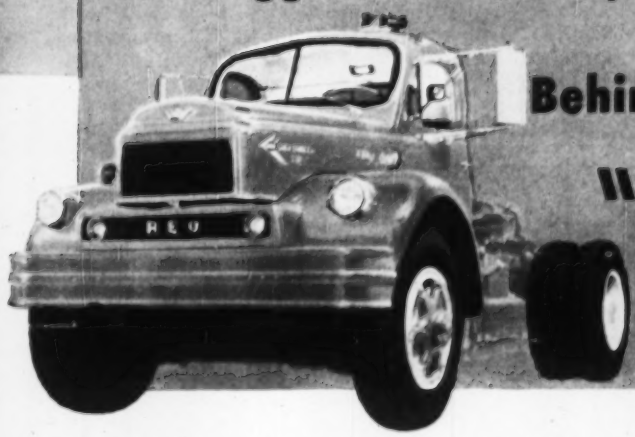


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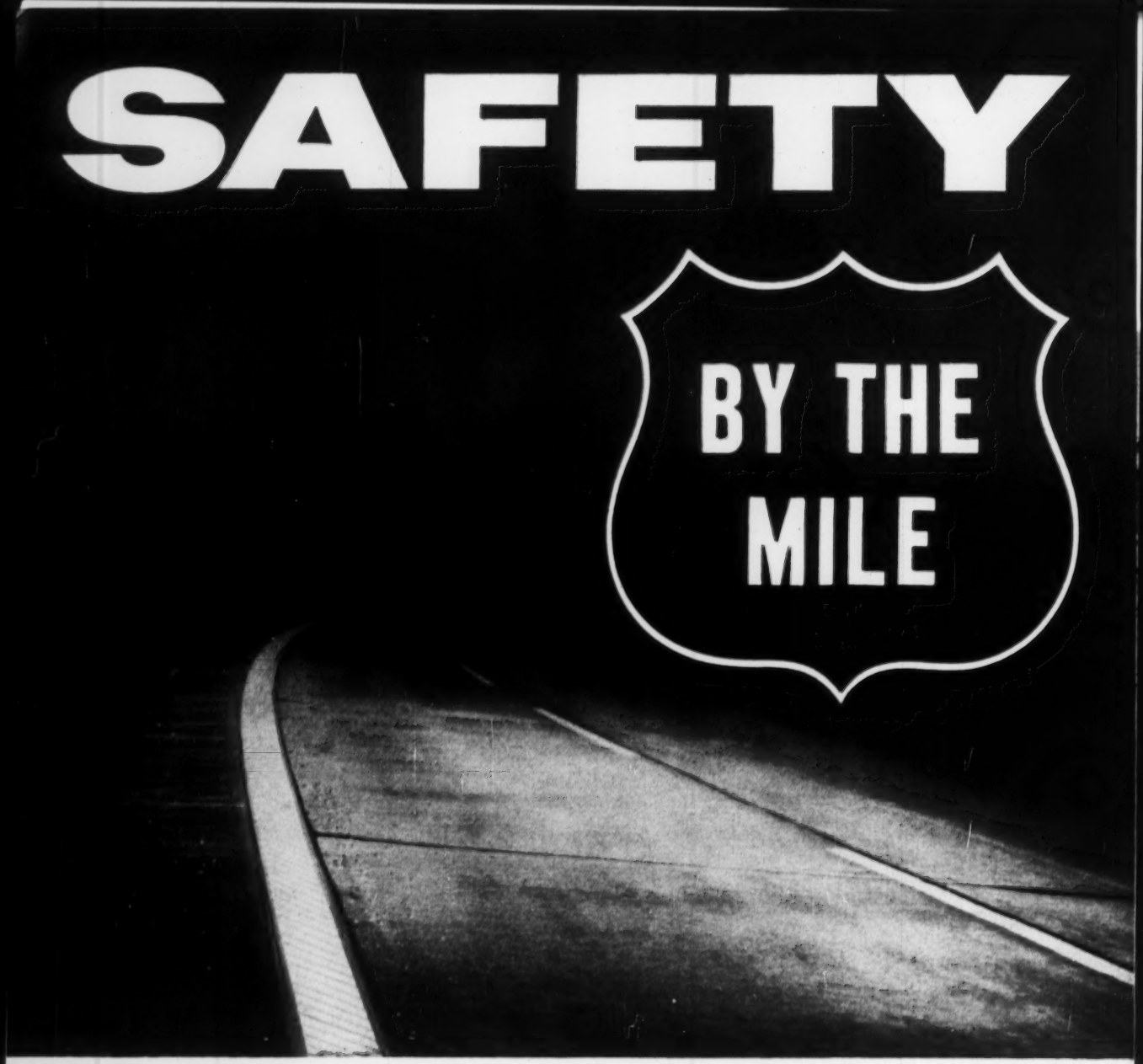


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State changes design of two projects as . . .

# Steel Shortages Strike Home

The California Division of Architecture has changed the design on two major building projects as a result of the shortage and high price of steel.

The division converted the design on the $7-million San Francisco and $9-million Los Angeles state office buildings from structural steel and concrete to reinforced concrete. Bids will be called for both projects early next year.

In a report to Gov. Goodwin J. Knight the division said: "Steel shortages, particularly in heavy rolled structural shapes, are causing a reevaluation of design criteria on a number of state projects that originally proposed the use of large tonnage of heavy structural steel shapes."

On at least two major office buildings—Los Angeles and San Francisco—substantial savings in cost is indicated by changing the design from the originally contemplated structural steel with concrete to reinforced concrete construction.

As an example of the effect of steel shortages, the division noted that structural steel for the Department of Employment Office Building completed in December 1955, cost approximately $185 per ton fabricated and erected in Sacramento.

Structural steel for the Veterans Affairs Building, now under construction, cost $225 per ton fabricated and erected in Sacramento. This steel was delivered in January 1956. The latest project that required substantial tonnage of heavy rolled shapes was the Department of Employment Office Building in Los Angeles in which the steel cost approximately $325 per ton fabricated and erected in Los Angeles.

The best possible sources of information indicated a proposed cost of structural steel on the two office building projects—San Francisco and Los Angeles—at $350 to $380 per ton with delivery from 11 to 13 months after placement of the order. It was on these facts the decision was made to convert the design from structural steel and concrete to reinforced concrete.

The architectural division's report expressed concern at rising construction costs and noted that in the past several months state building work has drawn only one to three bidders compared to six to eight a year ago for similar projects.

"Obviously the lessening competition on all major construction projects ultimately and invariably reflects in higher prices," the division pointed out. "A marked rise in building construction cost has been experienced since Jan. 1, 1956. According to the latest bids received by the division and based upon cost estimates prepared in December 1955, it is apparent that overall building costs have risen 10 to 12% during the past six months. Involved in this price increase are approximately 15% wage increases granted organized labor as a result of union and employer negotiations, with a lesser increase being experienced in material costs."

## Barkley Dam Construction Scheduled to Start in April

The U. S. Corps of Engineers set a 7-year goal last week on completion of its $167-million Barkley Dam, powerhouse, lock and interconnecting canal on the lower Cumberland River.

Col. Eugene J. Stamm, Nashville District Engineer, said if everything goes according to the schedule the Corps has set up, the finishing touches will be put on the project's final phase—the powerhouse—in 1963.

"Exploratory drilling operations are being conducted by three separate contractors and by government forces on an 'around-the-clock' basis already," Colonel Stamm said.

"It is expected that this work will be sufficiently advanced by next April to permit construction to begin on the lock," he said.

The first construction contract, Colonel Stamm said, will be for construction of this cofferdam and excavation for the lock itself.

"Contracts for construction of the dam, for powerhouse equipment, and for the powerhouse, will follow," he said.

About a year before the generation of power begins at Barkley, Colonel Stamm said, the lower Cumberland basin will have been transformed from a narrow river bottom subject to unpredictable floods into a massive lake paralleling the Tennessee Valley Authority's Kentucky Lake, a few miles to the west.

The ambitious lower Cumberland project will force the evacuation of two small river towns, Kuttawa and Eddyville.

Civic leaders in the two towns already have under consideration a merger into a single city. The new city may be named Barkley, Ky., in memory of the late Sen. Alben W. Barkley, Paducah, former vice president, for whom the project is named.

In addition to properties in the two towns, Colonel Stamm said, thousands of acres of bottom-land farm property must be acquired.

# Building Waits to Get Its Footing

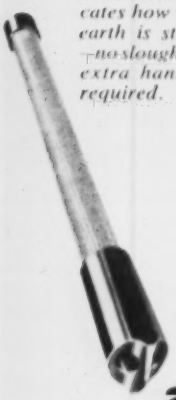
Usually foundations go in first—all at once. But builders of this mammoth 325,000-sq ft mill for the American Brass Co. at Paramount, Calif., are just now getting around to the foundations to carry their heavy machinery. Reason: The flood last year at the company's eastern plant absorbed all the firm's engineering talent for clean-up, and the company didn't want to delay construction until the engineers would have time to work out machinery placement.

For the foundations, 17,000 cu yd of concrete will be cast. Walls are asbestos-cement siding and the roof is metal decking. Cost of the steel-framed building is $18 million including equipment. Completion is scheduled for July '57.

Rosendahl Corp., Los Angeles, Calif., foundation and enclosure work contractors on the job, have also been awarded the contract to complete construction and install all machinery and mechanical work.

# STANG SETS A WELLPOINT RECORD

*Note shovel marks next to concrete weight in foreground of photo. This clearly indicates how well the earth is stabilized —no sloughing—no extra hand work required.*



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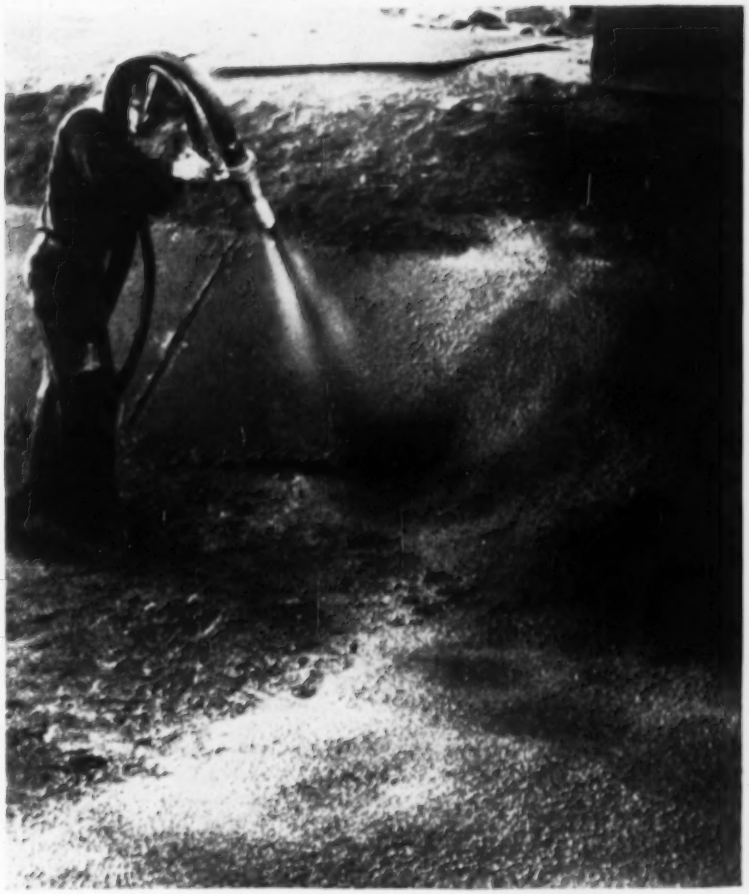


**CANAL IS COATED** with an asphalt emulsion mortar using modified gunite equipment during tests in California. Mortar includes asphalt emulsion and portland cement as well as sand and water.

**Flexible and Durable . . .**

# Asphalt Gunite Is Used to Line Canals

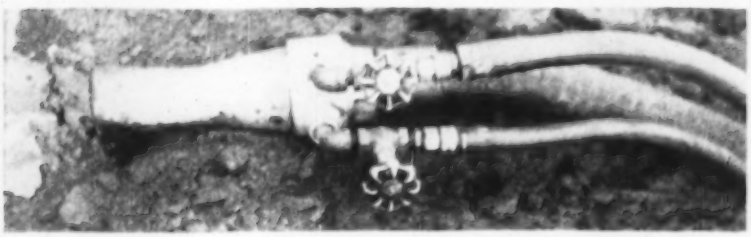
A new asphalt gunite process, designed to provide a flexible and durable wearing surface for canals and reservoirs, has been developed through a series of experimental tests in California.

Official designation of the process is "pneumatically applied asphalt emulsion mortar." And that is a fair description for the material includes sand, portland cement, emulsified asphalt and water. As equipment used to place it is modified from conventional "gunite" facilities, the entire process has become known in the field as "asphalt gunite".

The test installations now in their second and third season of service have proven that a non-rigid, water-impermeable, erosion-resistant lining can be applied by the new procedures.

The best mixture developed by the test procedure calls for about 12% emulsified asphalt (SS-1), 3 to 5% portland cement, about 10% water and the rest sand (percentages are in terms of percent of dry weight of sand). The sand is same as that used for conventional gunite (a representative gradation used is more than 95% passing a No. 8 screen, from 40-45% passing a No. 20 screen, about 20% passing a No. 40 screen, about 5% passing a No. 50 screen and less than 2% passing a No. 200 screen).

Modifications of conventional gunite equipment include an improved water ring for better mixing in the nozzle and an extra hose line to provide separate sources for the emulsion and the water. The sand-cement is transported to the nozzle through a 1½ in. ID hose at a pressure of about 60 psi. Water and asphalt emulsion are introduced through separate ¾ in. hose lines, each of which is valved to control the amount of emulsion or water.



**NOZZLE IS FED** by three hoses instead of the usual two. Extra hose is for asphalt emulsion. Valves control flow of water and emulsion.

• **Asphalt gunite history.** Pneumatically applied asphalt emulsion mortar was first attempted on canal linings

## . . . Test linings of asphalt gunite stand up well

**BEFORE and ONE YEAR AFTER** lining an Orland project lateral. Process is intended for use on new linings for small canals as well as for repairing linings on bigger units.

by the U. S. Bureau of Reclamation in 1947 on the Ridenbaugh Canal near Boise, Idaho. In this first experimental lining work, liquid asphalt (RC-0 cutback) and a mixing-type emulsified asphalt were substituted for portland cement as a binder for the sand. This was applied over the surface of a partly deteriorated concrete lining to a minimum thickness of ½ in. A second installation attempted thinner coatings. After a year's service, both installations showed distress due to peeling from the concrete and to erosion.

In spite of this early experience, Bureau of Reclamation engineers decided that this type of lining still had possibilities if a method could be developed that would enable the mortar to harden or set within a shorter period of time after application. If this could be done, the asphalt-binder should provide toughness, imperviousness and flexibility without the characteristic problem of cracking usually associated with conventional gunite. USBR engineers thought that the hydration of portland cement would accelerate the "breaking" of the asphalt emulsion and thereby provide a hardened lining.

In early 1954, two installations were constructed by the USBR at the Orland project in California. Principal modifications to the original Idaho work were the addition of portland cement and use of additional water.

Primary purpose of the Orland work was to determine if a tough, water-impermeable, erosion-resistance, durable and pliable lining could be constructed by pneumatic methods using asphalt. Other objectives included the development of proper construction procedures and equipment requirements. The investigations also considered cracking and the control of cracking, weed growth control and rebound problems.

Part of the Orland work was conducted on a main canal having a capacity of 250 cfs, water velocity of 5.2 fps, wetted perimeter of 25 ft, bottom width of 15 ft, water depth of 2.5 ft and 1½ to 1 side slopes. This canal is continually filled with water from March to October. And it carries a silt, sand and gravel load. It had an existing concrete lining that was in a badly damaged condition. Larger holes in the lining were filled with gravel or lean concrete mix prior to applying the asphalt gunite.

The other installation was on a small unlined lateral that is filled with water intermittently in accordance with irrigation demand. This lateral has 40 cfs capacity, 1 fps velocity, wetted perimeter of 12 ft, bottom width of 4 ft, water depth of 2 ft, and 1½ to 1 side slopes.

On these two jobs, thicknesses of both 1 in. and 2 in. were applied. Water percentage was varied from 8 to 11%—in addition to water already in the emulsified asphalt. Asphalt content was varied from 8 to 13%. Portland cement content was in the following percentages—0, 3, 5, and 10.

The work was done by Johnson-Western Constructors, who did considerable experimentation at their Oakland, Calif., yard prior to moving on the job. In this work they received advice and assistance from American Bitumuls & Asphalt Co.

• **How it's done**—The application procedure begins with sand and cement batched together in the hopper of an 11-cu ft mixer. This mixture was transported by conventional gunite procedures to the nozzle at a pressure of about 60 psi. Emulsified asphalt stored in insulated tanks was conveyed to the nozzle through a 2 in. hose by a gear pump developing about 120 psi. Water was introduced through a separate 2 in. hoseline.

Proportions of asphalt and water were controlled by the contractor by varying the pump pressures and by valve settings at the nozzle. Percentage was measured by hourly checks of quantities drawn from calibrated storage tanks. Minor adjustments were made in accordance with hourly checks of the material used.

All of the 1954 work was done during weather that was extremely poor from a construction point of view. Temperatures were generally in the low ranges, sometimes approaching freezing in the early morning hours. A severe wind and rain storm occurred in the mid-construction period. But no damage resulted to the lining already placed except in those areas that did not have any portland cement added to the mix.

Based on favorable results of lining at Orland, USBR engineers decided to broaden the scope of possible usage by making an installation on a large canal. For this installation, a reach of the Madera Canal was chosen that had three conditions favorable to the investigation: existing canal was unlined, considerable seepage was occurring, and a siphon at the upstream portion of the experimental reach caused turbulence creating an erosion more severe than normal. This portion of the Madera Canal has a capacity of 625 cfs, velocity of 2.73 fps, wetted perimeter

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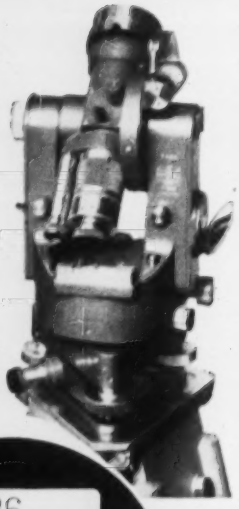

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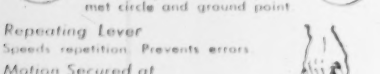

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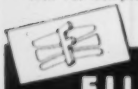

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## . . . Control of the mix is important

**EQUIPMENT** *includes conventional gunite machines with addition of an extra tank truck for asphalt emulsion.*

of 52 ft, bottom width of 20 ft, water depth of 7 ft, and 1½ to 1 side slopes.

The lining was constructed 2 in. thick on the side slopes and 3 in. thick on the bottom. Additional thickness on the bottom was needed because of wetness and irregularity.

All the Madera work called for 12% asphalt emulsion. For the side slopes, 5% portland cement was used and for the bottom 5% portland cement. The additional cement on the bottom was to assure faster hardening in the presence of the wet subgrade.

Here again weather conditions were decidedly unfavorable. To help overcome the natural moisture in the air and on the canal, a small sand drier was installed so that about 50% of the sand was heated before going into the nozzle. The sand-cement mixture was thus about 120 F with the mortar temperature being from 70 to 80 F immediately after application.

On the Madera work, an attempt was made to meter the water and the asphalt emulsion. The latter device did not work and regulation of the asphalt was subsequently turned over to the nozzleman and the foreman who controlled the asphalt emulsion pump.

Cost of the asphalt gunite lining is comparable to other lining or sealing methods. At Orland, USBR costs were $2.10 per sq yd for each 1-in. thickness. At Madera, cost ran up to $2.94 a sq yd for a 2-in. thickness.

Rebound does not appear to be a significant problem. At Orland, nothing was done to the rebound and after a year's operation the rebound layers were still intact. At Madera, an attempt was made to penetrate the rebound with a seal coat, but full depth penetration could not be obtained.

The two test programs demonstrated that asphalt gunite work can be done during the winter months. No work was done during periods of severe freezing. Heated sand helps during cold-wet weather work. And it is thought that heating the emulsion would help too—although this was not done in either test program.

The tests also demonstrated that the material would bond to old concrete linings.

The most desirable range (3 to 5%) of portland cement content was established. The asphalt gunite with no portland cement was subject to erosion particularly during the first few days. And the section with 10% cement showed some initial shrinkage cracking.

Water content was also shown to be important. If the mix was too wet, the mortar would tend to run down the sides. And if too dry, rebound was excessive—more than ¼ in.

In addition to the contractors, Johnson-Western Constructors, many individuals have contributed to the development of asphalt gunite. Included are L. M. Ellsperman, USBR, Denver; L. H. Kristol, formerly civil engineer with the USBR in California; and F. N. Finn, area engineer, The Asphalt Institute, Sacramento, Calif. Aiding work at Orland was R. W. Hollis, irrigation manager, Orland Project. And aiding the Madera work was A. E. Greenlaw, USBR resident engineer.

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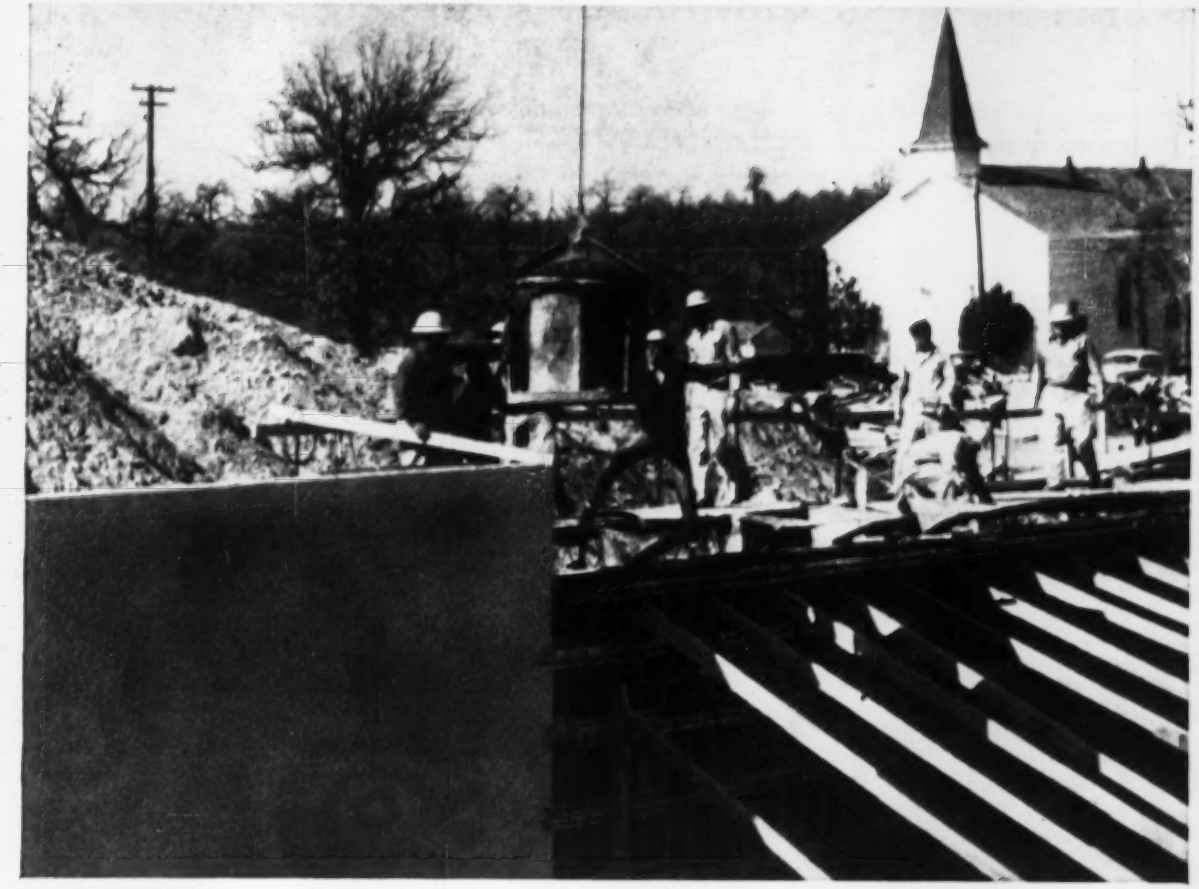

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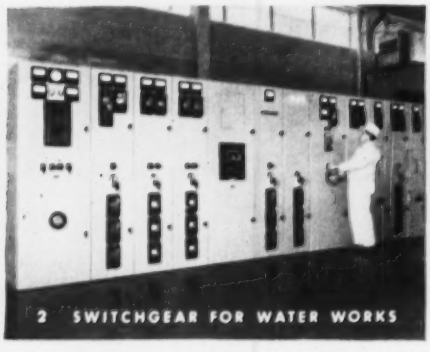
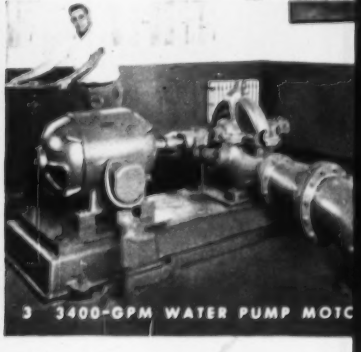


2 SWITCHGEAR FOR WATER WORKS



3 3400-GPM WATER PUMP MOTC

1. Type LD runway and taxiway lights at the St. Louis Airport, typical of the complete line of Westinghouse airport lighting units. 2. Block-built from unitized assemblies, this metal-clad, high-voltage switchgear vault receives incoming power from the Houston, Texas, Water Works System. 3. Westinghouse 200-hp, 1800-rpm, drip-proof motor driving a 3400-gpm pump at the Gloucester, Mass., pumping station. 4. Simplicity, safety, ease of maintenance are featured in this Westinghouse control center and switchgear distributing power for the San Jacinto, Calif., Water System. 5. 500-hp, Westinghouse compressor motor serving a modern power company building. 6. Co-ordinated Westinghouse motor control for the compressor motor shown in illustration 5.

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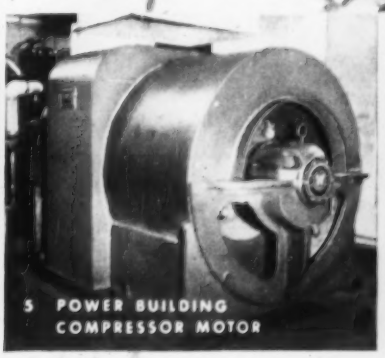


5 POWER BUILDING COMPRESSOR MOTOR

6 MOTOR CONTROL UNIT

**Groined arch roof of a Palo Alto, Calif., market highlights simple architectural treatment. The 85 Purity stores built since 1938 are of arched construction. This is the first of several planned with intersecting arches**

# Six Three-Hinged Arches Form Market R

H. M. Engle
Civil and Structural Engineer
San Rafael, Calif.

A recently completed market building at Palo Alto, Calif., features a central groined roof dome formed by a combination of six three-hinged steel arches. And it includes diagonal arches that intersect at the midspan with a unique detail permitting rotation in both directions. Three additional markets of similar construction are planned at Eureka, Mill Valley, and Sunnyvale, Calif.

In plan, the building is 170x120 ft. The center 76-ft square area is topped by the two intersecting arch barrels forming the groined arch or vaulted roof. The arch roof is carried on four three-hinged face arches of 76-ft span and 12-ft rise. Completing the dome are two diagonal three-hinged arches of 107.5-ft span and 12-ft rise.

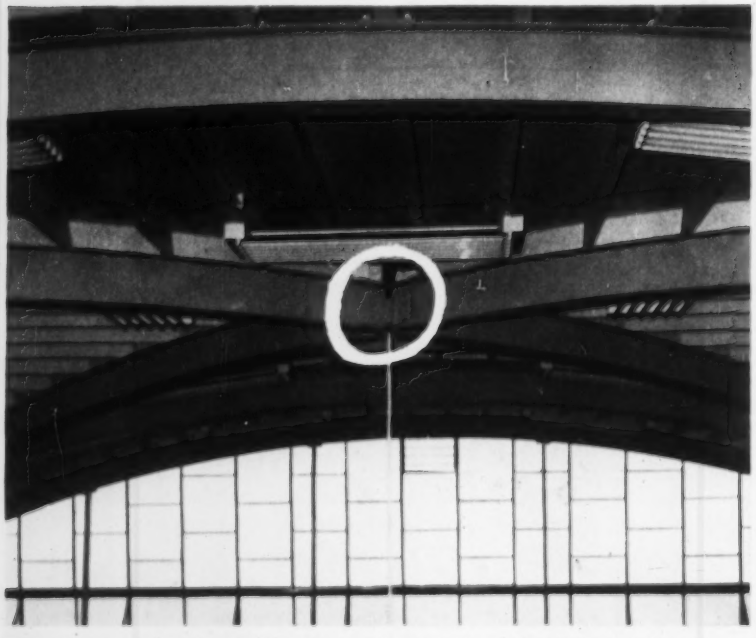
The face arches are 14 in., 43 lb, wide-flange sections. In fabricating these arches, the beams were split in two at the web center-line. Each half was bent cold to the required curved shape. Then the halves were joined by continuous welding.

The diagonal arches were fabricated of plates welded together to give a section equivalent to a 14-in., 78-lb, wide-flange beam (¾-in. web plate and ⅝-in. flange plates).

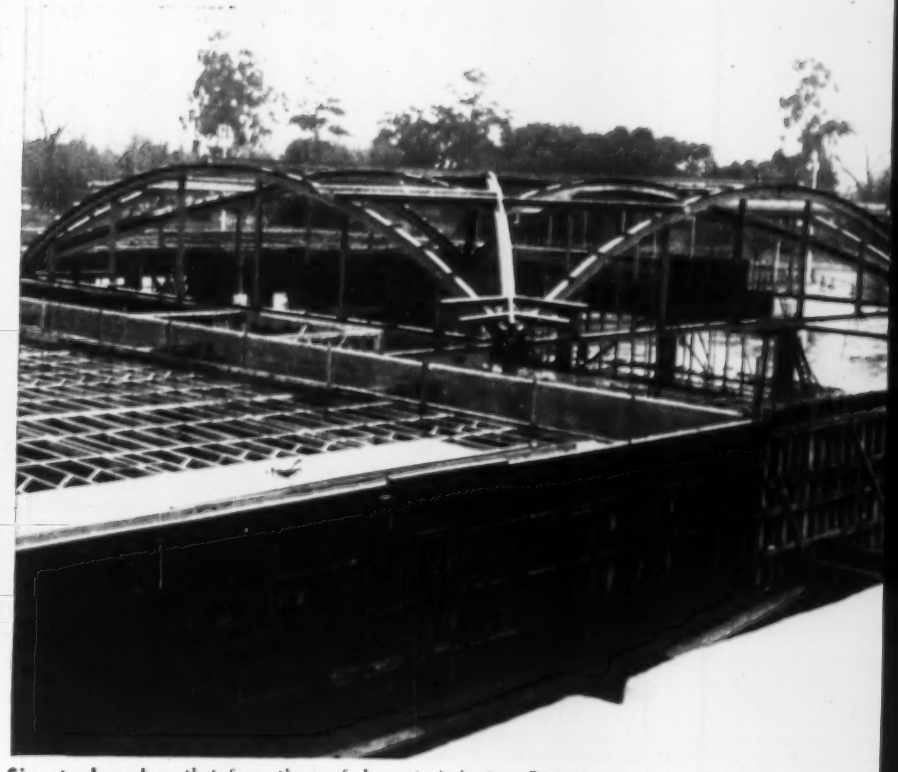
The center hinge for the diagonal arches is unusual in that it allows rotation in two planes at right angles. A circular steel plate wheel assembly was worked out that is positive in allowing hinge rotation under arch deflection and yet was easy to erect.

The hinge design calls for replacing the arch web material near the joint with 1-in. plates. These plates are milled at the joint end to 7-in. dia. Fitted between the ends of the arch halves is a pair of intersecting grooved wheels with the 7-in. dia groove fitting the milled part of the 1-in. web plates. The grooves are 1¼ in. wide.

To erect the double-hinged joint, one half of one wheel was temporarily left off. And one half of the



**Easy to erect** though unusual in design, the center hinge for diagonal arches presents a clean appearance, while it permits both arches to rotate.



# Roof Dome

other wheel was fixed by welding to its mating arch web plate. Then the loose half wheel was positioned with its arch section and bolted to the rest of the intersecting wheels.

Thus, rotation is possible in both arches. And as this joint is always in compression, there is no possibility of the arches parting at the hinge.

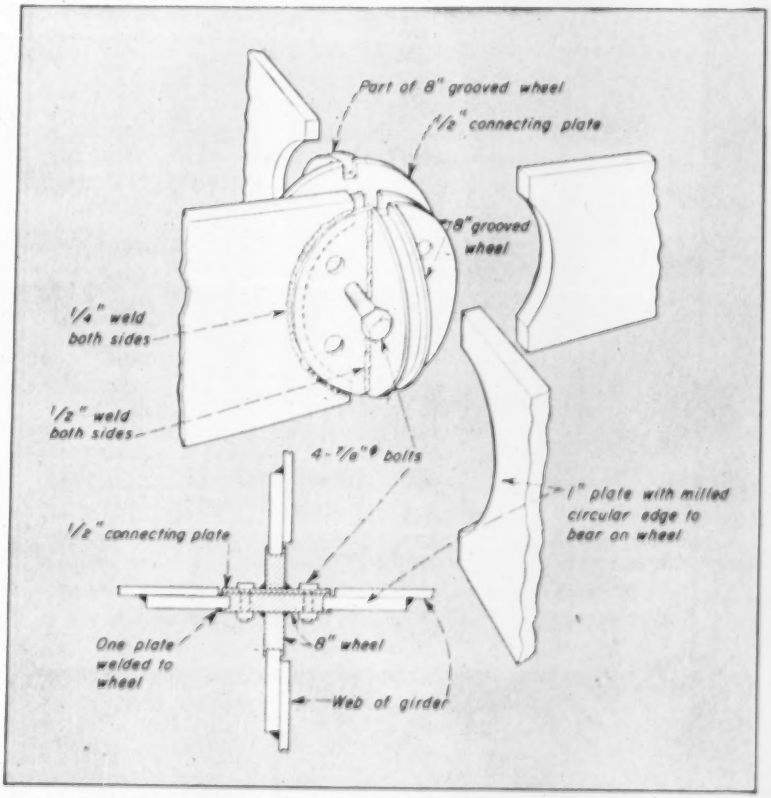
The 8-in., 35-lb. wide-flange tension ties for the face arches also take thrust from the diagonal arches. In addition, the tension ties act as supports for the low roof, the loads being carried to the arches from the tension ties by vertical connecting members.

The groined arch area is carried on four round tapered steel columns, 15-in. dia at the top and 24-in. dia at the base. These 2-in. thick steel shells are designed to take all lateral and vertical loads. The columns are embedded in 15-ft-dia octagonal footings. They are designed as vertical cantilevers, fixed at the base, for a lateral earthquake force of 10% of the roof dead load plus live load. Each column top takes three arch reactions.

The steel column shells required special fabrication. They were heated for bending, and all joints were cut to a 60-deg V and butt-welded solid.

In addition, and as a safety factor, the steel columns are filled with concrete reinforced in the center with a spirally wrapped cage. This forms a reinforced concrete column that can take all vertical loads. Thus, damage to the exposed steel shell in a fire

**Six steel arches** that form the roof dome include four 76-ft face arches and two 107½-ft diagonal arches. All arches have 12-ft rise. Roofing is 3x8-in. timber joists on 24-in. centers with ½-in. plywood sheathing.


Part of 8" grooved wheel
1/2" connecting plate
8" grooved wheel
1/4" weld both sides
1/2" weld both sides
4-7/8"ø bolts
1" plate with milled circular edge to bear on wheel
1/2" connecting plate
One plate welded to wheel
8" wheel
Web of girder

**Center hinge design** allows rotation in two planes at right angles. Circular steel plate wheel assembly permits hinge rotation under arch deflection.

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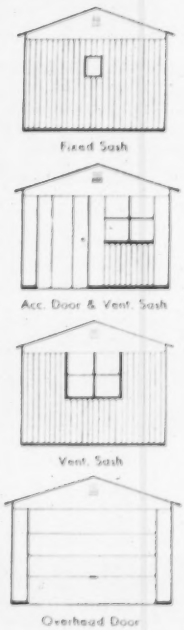


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could not cause collapse of the roof.

The grouted arches carry 3x8 timber roof joists on 24-in. centers and ⅝-in. plywood sheathing. The low roof is carried on open web steel joists with angle top chords. Exterior walls are of reinforced concrete.

• **Erection procedure**—For erection the columns and the tension ties were placed first. Then two truck cranes were called into action for erecting the arches. The diagonal arches were positioned with each truck crane handling half an arch.

This, of course, made a stable structural system. The face arches were likewise erected by the two truck cranes. And before the cranes released their load on each face arch, a tie to the diagonal arches was made.

• **Previous designs**—Arched-type construction is typical of the chain of markets built and operated by Purity Stores, Ltd., in Central and Northern California.

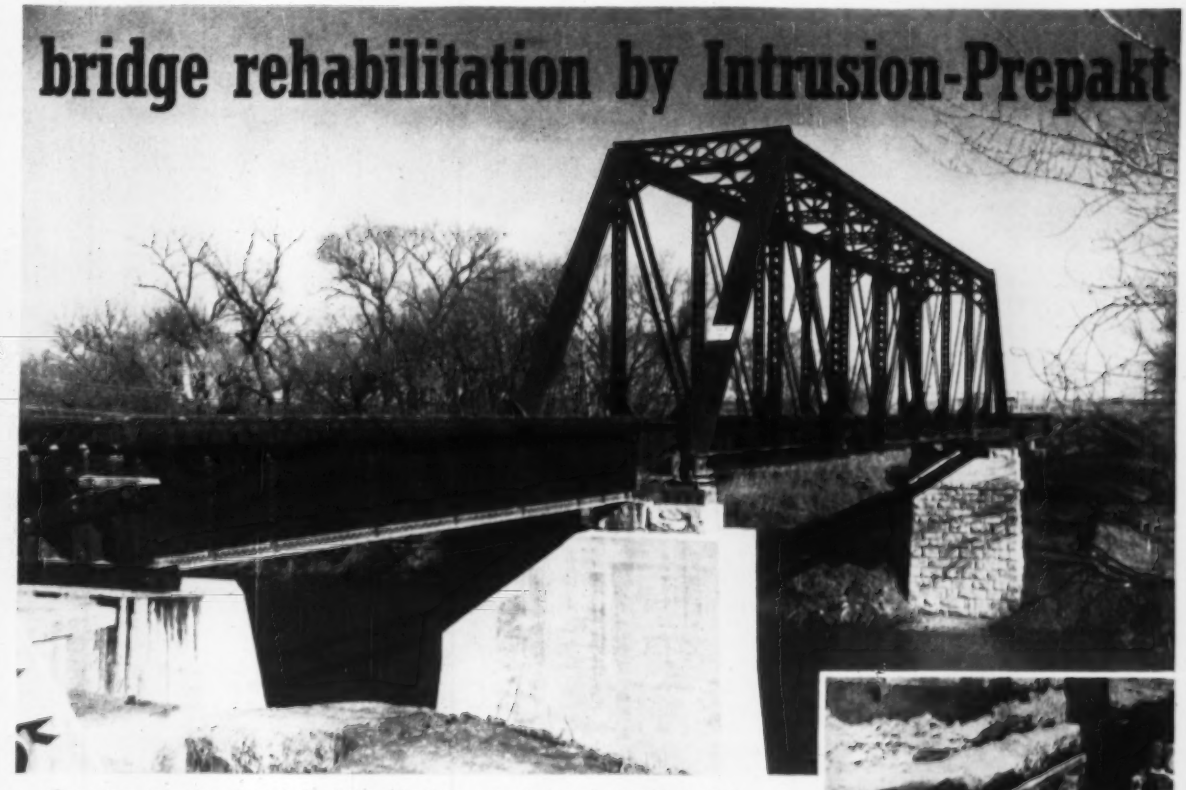
Timber arches were used in a few of the early markets. All of the later structures feature steel and reinforced concrete arches of either two-hinged or three-hinged designs. The two-hinged arches—both steel and concrete—are all of semicircular shape and 50-ft span. The three-hinged steel arches have been used with spans up to 85 ft. Some of these have vertical wall legs and straight sloping roof legs. Others have curved roof legs. And a few have legs curving on a double radius from the base hinge to the crown hinge.

• **Looks and costs are attractive**—Public reaction to the Purity markets has been good. This is particularly true of the new Stanford Shopping Center market described in the foregoing. Arch design is simple, clean-cut and pleasing in proportion and details. Natural lighting on the inside is excellent.

And cost was surprisingly reasonable, amounting to less than $11 a sq ft for the completed building, without store fixtures.

Architectural design was worked out by Harry Weese, architect, Chicago, Ill. The author has served as structural engineer for all markets in the Purity chain. And Younger Bros., Inc., has constructed all 85 Purity markets built since 1938. Schrader Iron Works of San Francisco has furnished the steel for most of the markets, and is responsible for developing special techniques required in the fabrication and bending of the arches. All markets in the Purity chain are designed and built under the direction of J. R. Niven, chief executive officer, Purity Stores, Ltd.

# bridge rehabilitation by Intrusion-Prepakt



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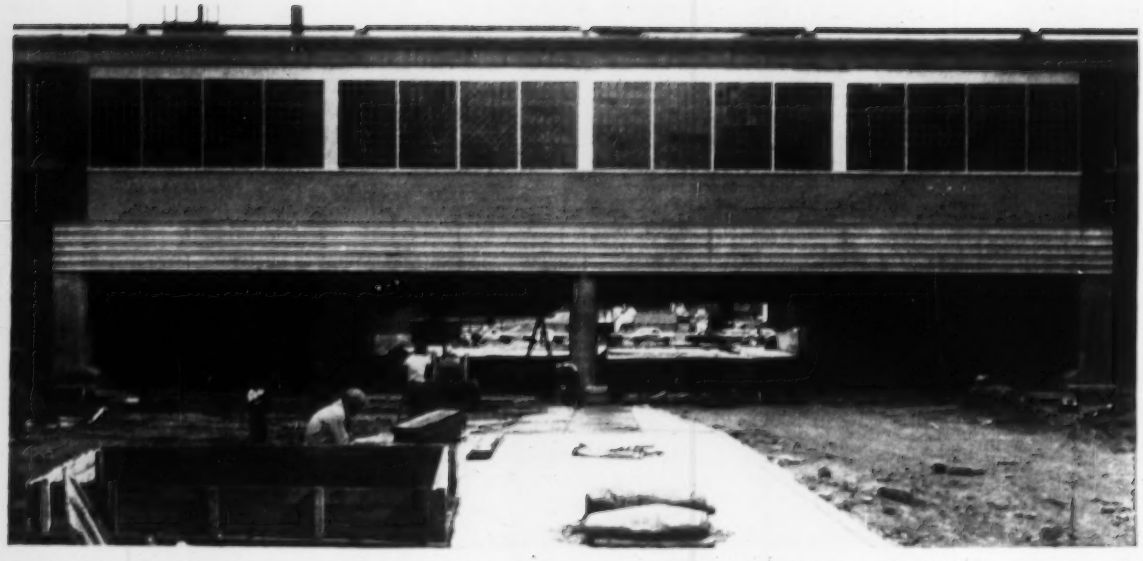


**Extending Chicago's new 8-lane Congress Street Expressway under its old LaSalle St. railroad station developed into an unusual reconstruction project where . . .**

# Jacks Put Tracks on Precast Spans


Milton Pikarsky
Chief Engineer
Plumb, Tuckett & Pikarsky
Gary, Ind.


A superhighway through one of Chicago's major railroad passenger terminals has been recently completed. Chicago's Congress Street Expressway now runs beneath 11 main tracks of the LaSalle St. passenger station.

Track level in the station is at the 2nd floor level, elevated 15 ft above street level. This called for rebuilding the track structure to carry railroad traffic over the 8-lane divided expressway, which passes through the station just below the existing street level.

**• 34 bridge spans**—Within the railroad station limits the Congress Street Expressway has a total width of 116 ft. Its two roadways are each 44 ft wide, separated by an 8-ft median and flanked on each side by 10-ft sidewalks.

Railroad traffic is carried over this 116 ft of expressway on 60-ft-span deck-type bridges supported on piers outside of the sidewalks and on a central pier that is located in the median.

There are two spans for each of the 11 tracks and two lighter spans for each of six station platforms, making a total of 34 bridge spans. Each 60-ft span carrying railroad tracks is made up of four wide-flange beams, while the platform spans have only two lines of wide-flange beams.

**• The toughest problem**—The major consideration that made this remodeling project so unusual was that all essential operations of the railroads had to be adequately maintained during the entire construction period. This was one of the toughest problems from the standpoints of both design and construction.

At the track level there are about 9,000 train movements monthly involving over 250,000 railroad cars, which transport over 1,000,000 passengers, great amounts of baggage, express and mail. Such operations utilize the 11 tracks and 6 platforms.

**• Construction restrictions**—In order to maintain railroad service without serious interruption and to complete the work in the shortest time consistent with economy, the contractor had to comply with several restrictions. First, he could not take more than two tracks out of service at any time.

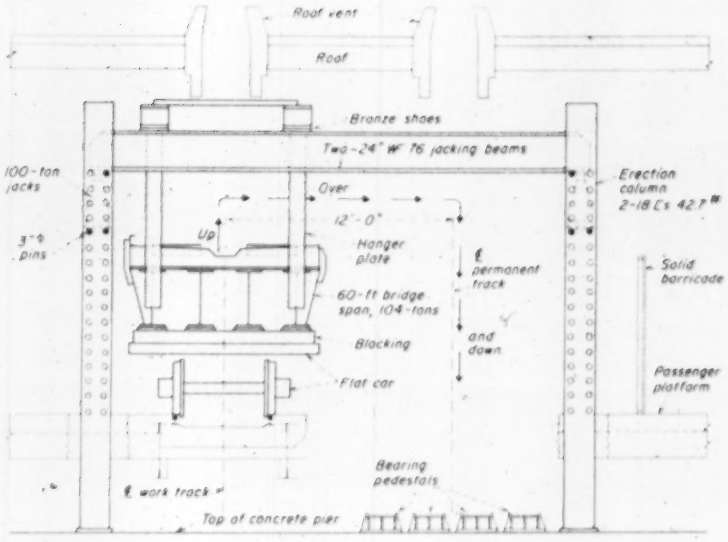
Here's the reason: Tracks out of service meant that 120 ft of rail from the bumping posts to the north side of the expressway, plus 120 ft of rail over the expressway roadways and sidewalks, and 40 ft of rail immediately south of Congress St. would become unavailable for railroad service. These 280 ft of track would deprive the station of 3½ car lengths for each track not in operation.

**• Solid barricades**—A second contract provision had a three-fold safety purpose. It required the contractor to completely enclose the 280 lin ft of working area with solid barricades 8 ft high. This was to protect the public and prevent interference with normal station operations by discouraging so-called sidewalk superintendents from blocking the station platform.

More important, however, the barricades provided the contractor with an enclosure within which he could work during any hours he chose. It also gave him a protected area for storing materials and equipment. The contractor was thus able to schedule his operations to his best advantage. For replacement of the track structure, the working area was 50 ft wide, and encompassed two tracks.

**• Heavy holiday traffic**—Another restriction was occasioned by heavy passenger, mail and express operations during the Thanksgiving and Christmas holiday seasons last winter. Consequently, all station tracks and platforms had to be kept in service for their entire lengths from Nov. 15 through Jan. 10. To meet this requirement the contractor was not permitted to begin any operations involving the track or platform structures which he could not complete by Nov. 15 of last year.

Finally, it was incumbent upon the contractor to complete the renewal




**JACKING SEQUENCE:** Each 104-ton, 60-ft bridge span was hoisted clear of its flat car by four 100-ton jacks, shoved 12 ft sideways by two 15-ton track jacks and lowered onto bearing pedestals atop the new piers.

of the track and platform structures with the maximum time of tracks out of service limited to a total of 180 calendar days.

After considerable study by the engineers of Chicago's Department of Public Works and the Rock Island and New York Central Railroads, a feasible solution to the problem was evolved, consistent with the restrictions. It was included in the contract documents as a suggested method of procedure. The low successful bidder, the James McHugh Construction Company, Chicago, elected to follow the suggested method.

**• Two decades of planning**—Working out the details and procedures of removing the old track-supporting structures and replacing them with the 34 new deck-type spans goes back several years. Planning for this section of the Congress Street Expressway began in 1939. By 1945 there was general agreement between Chicago, the New York Central and the Rock Island as to the method to use in carrying railroad traffic over the new expressway when it was built.

The new concrete piers supporting the new railroad spans were built as part of the present contract. Their footings rest on caissons which bear on hardpan 70 ft below street grade. Caissons for the center and south piers were built in 1947 just prior to the construction of the subway tubes that they straddle. The north line of caissons was completed in 1951.

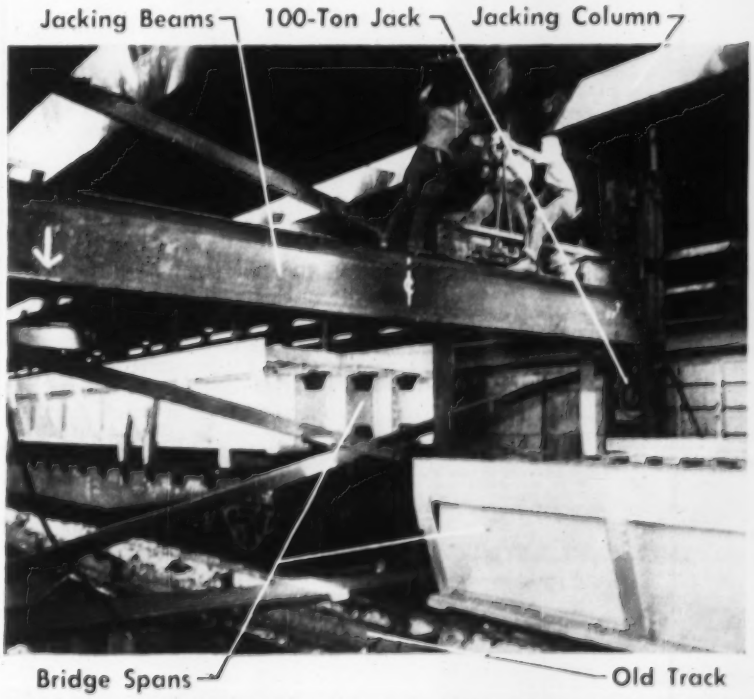
Originally, the 11 tracks were supported by plate girders carried on columns spaced 15 and 30 ft longitudinally, and 12 and 24 ft transversely.

Prior to the construction of the piers, the facilities of the railroads at street level were rearranged. These include taxicab driveways, passenger transfer service, baggage and mail handling facilities, railway express operations and numerous other services which were located in or were affected by the location of the expressway.

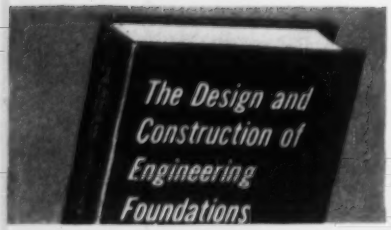
**• Erection procedure**—While this preliminary work was going on, the steel for the track and platform units was being fabricated at the American Bridge Company's Gary, Indiana, plant. Then, the track and platform spans were shipped to Chicago where they were completed in a construction yard furnished by the railroads. The yard was located a short distance from La Salle Street Station. Two construction tracks were built and used to tie into the adjacent railroad yard.

After the spans had been completed, the contractor was permitted to take two station tracks out of service and begin construction of the necessary barricades. When the barricades were in place, one of the two out-of-service tracks and its supporting structure were removed while the other remained to serve as a "work" track. The erection equipment, consisting of jacking columns, jacking beams and hanger plate assemblies were then set in position.

A track span weighing 104 tons was loaded onto a flat car in the construction yard and brought into the railroad station on the work track which was adjacent to an open hole that had been cut in the old concrete floor. This area was formerly occupied by an old track and supporting structure. The new span was spotted with its ends directly under the jacking beams. The hanger plates were then fastened to the ends of the track




**WORKMEN ATOP JACKING BEAMS** operate track jacks to slide 60-ft, 104-ton bridge span sideways onto pedestals atop new piers in the open area from which old track structure has been removed.

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## . . . Restored track becomes work track

**BRIDGE SPANS** (foreground) were assembled in nearby construction yard, complete except for the railroad rails. Platform units (background and at right of crane) required only two lines of wide-flange stringers.

spans; one hanger plate at each corner.

• **Heavy-duty jacks**—By means of 100-ton pneumatically operated jacks located inside each of the four packing columns, the packing beams were raised slightly, permitting the removal of the flat car. Next, using two 15-ton track jacks mounted on top of each packing beam, the hanger plate assemblies were moved 12 ft sideways until the track span was located directly above its final position.

After this, the packing beams were lowered about 10 ft until the track span was seated. A second span was then positioned on the work track and similarly set in place. Rails were then spiked on the new track structures. This newly restored track, in turn, became the work track for installing a second pair of deck spans replacing the original work track. A service walk was then suspended between adjacent track spans.

After the construction of a pair of tracks and their supporting structures, the contractor temporarily omitted the installation of a loading platform. Instead, he erected the next pair of tracks and their supporting structures. One of these new tracks became a work track, while a temporary platform was laid over the other. The existing platform span was then removed and passenger traffic detoured over the temporary walkway.

• **Platform erection**—Each 60-ft span loading platform weighed 50 tons. Like the heavier spans, they were fabricated in the construction yard and moved into the station on flatcars. Two self-propelled railroad cranes towed the flatcar into position and erected the platform span. The cranes had specially designed short booms, since vertical clearance within the station was limited to 16 ft.

• **Engineers in charge**—Plans for the $3-million reconstruction project to carry railroad traffic over the expressway as it passes through the La Salle Street Station were prepared by the Bureau of Engineering of Chicago's Department of Public Works. George L. DeMent is commissioner and Dick Van Gorp, chief engineer.

Both railroads assisted with the designs and construction supervision. L. H. Simpson and W. B. Throckmorton are chief engineers for the New York Central and Rock Island, respectively. The author served as liaison between the railroads and Chicago. Steel erection was by the E. K. Kettler Co., Chicago.

Construction of the entire project is under the general supervision of J. Walter Grimm, assistant chief engineer, Chicago. A. R. Kinder is resident engineer. General contractor is James McHugh Construction Co.

## New Trade Group to Certify Cold Cathode Products

The Cold Cathode Association, Inc., located in New York City, has been formed by a lighting-industry group that intends to set up a certification program for cold-cathode lighting products. Manufacturers of products meeting CCA specifications will have the right to use the association label.

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You are looking at a new kind of on-and-off-the-road truck tire. It is so *immune* to road hazards it runs over razor-sharp axblades without losing a pound of air. It has the deepest tread U. S. Royal has ever built into this type of tire. It is so *versatile* it outperforms on any wheel—gives greater stability on front wheels, increased traction on drive wheels, extra recaps on trailing wheels.

For dump trucks, transit mixers, log haulers . . . on any rig exposed to heavy impacts, tire-killing terrain. You'll enjoy fewer tire failures, less down-time expense, greater service dependability.

In sizes through 11.00. See your U. S. Royal Dealer . . . or write Truck Tire Department. You can specify "Super Fleetmaster" on your new equipment.

US RUBBER

**United States Rubber**

Rockefeller Center, New York 20, N. Y.

**Where minutes could mean lives . . .**

# $54 Buys Faster Gate Closure

A $54 investment by the Pueblo (Colo.) Conservancy District could mean the prevention of heavy damage and the saving of countless lives should Arkansas River flood waters ever again threaten the city.

The investment includes a tooled steel socket sleeve and a power chain saw transmission. Combining them allows the raising or lowering of the Conservancy District's huge 2,200-lb floodgates on the Southern Colorado Power Co. spillway by two men in less than 30 minutes.

Previously, the heavy gates—there are three—were manipulated by hand-operated cranking mechanisms, requiring six men, working at top speed, an hour to raise or lower the gates, according to John M. Holmes, Conservancy District president. The new system thus cuts the gate operation time more than 50% and reduces the manpower requirements 66%. But the main advantage is the half-hour additional flood insurance it provides against flood waters.

Mechanizing the raising and lowering of the gates is the idea of V. R. Blackburn, of Pueblo, president of the Blackburn Engineering Co. and one of the Conservancy District's consulting engineers. During one of the regular tests of gate operations, Blackburn was struck by the time-consuming and difficult task of hand-cranking. When he recalled the devastation wrought in the city by the flooding Arkansas River on June 3, 1921, he shuddered.

That catastrophe, in a few hours, destroyed 510 homes and 98 buildings and washed 61 other industrial plants from their foundations. Property damage was estimated at $19 million. To this day, no one has been able to say exactly how many died in the flood. Estimates range from 96 to more than 200.

But the city dug out from the debris, and, at a cost of $11 million, built a new levee and flood control system. Would this investment be wasted, Blackburn wondered, if the outmoded method of operating the floodgates should fail in another emergency? He searched his mind for a way to improve the method.

**OLD** It took two men an hour and 1,000 turns of the crank.

**• 1,000 turns by hand**—During the next regular check of the gate operations, Blackburn watched as the men hand-operated the gate mechanisms. Two men worked on each gate, one spelling the other as he tired. Blackburn asked the men to count the number of turns necessary to lower a gate. They counted to 1,000.

The mechanism's gear ratio of 8 to 1, with approximately four teeth to the inch, indicated 32 turns of the crank were required to lower a gate 1 in. Each gate must be lowered 63 in. to prevent the low-lying area behind them from being flooded. Blackburn needed a method that would speed the gate operation, yet would be feasible and economical enough for the district to undertake. When he submitted his idea, Conservancy District board members raised their eyebrows.

The district owns a gasoline-powered chain saw which has been used for the past several years to clear heavy brush and timber from the river channel. Blackburn proposed the purchase of a post-hole digging transmission attachment for the saw and the local manufacture of a tooled steel socket sleeve he designed. The sleeve cost $9 and the transmission $45. The sleeve fits snugly over the exposed crankshaft end of one of the gate gears.

**• 5 minutes now possible**—This summer, in its first test, the "mechanization" of the gate operation proved an outstanding success. Running the saw transmission at less than peak speed, each gate was lowered in 7½ minutes. If it became necessary, as in a flood emergency, the machine could be operated at capacity speed

**NEW** Chain-saw gas engine provides cranking power through post-hole digging transmission to close flood gate in as little as 5 minutes.

**In concrete or steel...you can set fastening studs *in seconds* with the REMINGTON STUD DRIVER**

**THERE'S NO TIME LOST** on a construction fastening job with the Remington Stud Driver. You can set up to 6 studs per minute with this powder actuated tool—every stud arrow-straight!

And here's more news: you can set *both ¼" and ⅜" diameter studs.* You have a choice of 40 styles and lengths of Remington Studs in both diameters—a choice of 22 or 32 caliber power loads. All it takes is 90 seconds to change barrels and you're ready for practically *every* fastening job—light, medium or heavy duty!

Once you see the Remington Stud Driver in action you'll be convinced that here is the easy, economical way to fasten door bucks, furring strip—any of dozens of fixtures—to steel or concrete. Why not ask your distributor for a demonstration? For more information, just mail the coupon below.

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and the gates lowered in five minutes, Holmes and Blackburn said.

In this section of the country, where flood waters move at express-train speed, precious little time is available between the sounding of a flood warning and completion of preparations to withstand one. With the new mechanical operation, valuable minutes can be saved by requiring the call of only two men to man the flood gates instead of six, as well as the speedup in lowering the gates.

Army Engineers at Albuquerque, headquarters for the Upper Rio Grande Basin, are enthusiastic about Blackburn's idea. The engineers, who provide aid and advice to flood control districts like Pueblo's throughout the West, believe the idea is readily adaptable for use by small districts with modest operating budgets. There are many similar conservancy districts with flood control projects like Pueblo's throughout the length of the Arkansas River from Leadville, Colo., to Great Bend, Kan., as well as along the Rio Grande and Pecos River basins in New Mexico and Texas.

In the Pueblo system, the floodgates prevent the backup of Arkansas River water into lowlands east and north of the river. Their rapid closing is imperative to prevent flooding in this area. A basin behind the gates is designed to contain an estimated 10 acre-ft of water.

## U. S. to Host for World Irrigation-Drainage Group

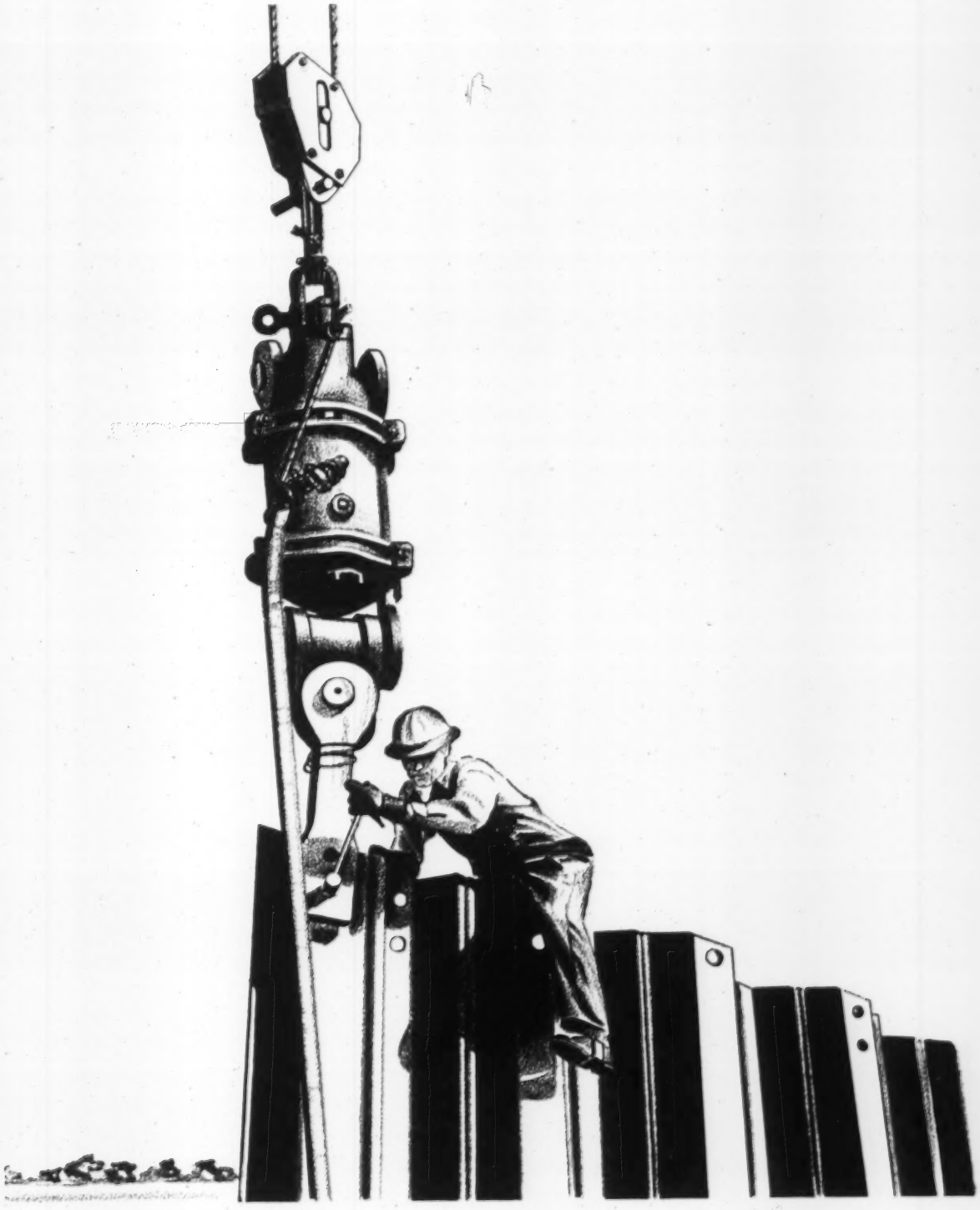
The Third Congress of the International Commission on Irrigation and Drainage will be held in San Francisco next spring, with representatives of 34 member countries expected to attend.

This third congress of the organization will follow that in India in 1951 and a second in Algeria in 1954. The U. S. national committee will be host.

April 29 to May 4 are the dates for sessions in San Francisco's Sheraton-Palace Hotel. The meetings will be followed by a two-week study tour intended to show delegates both private and public water developments of the West in addition to plants manufacturing irrigation equipment and machinery.

Walter E. Blomgren, consulting engineer of Denver, Colo., is chairman of the U. S. committee, and Prof. Frederick L. Hotes of the University of California is in charge of local arrangements for the meeting.

Information on the third congress may be obtained from the U. S. National Committee, International Commission on Irrigation and Drainage, P. O. Box 7862, Denver 15, Colo.



Size 800A Vulcan Pile Extractor pulling interlocking sheet piling of cofferdam for bridge pier construction on Calcasieu River in Louisiana.

**VULCAN IRON WORKS INC. CHICAGO, U.S.A.**

# "Usable" horsepower replaces engine size as gauge of shovel-crane power

It's important to judge shovel-crane work potential on the basis of usable horsepower rather than engine size. Proof: size for size, a Link-Belt Speeder delivers up to 40% more horsepower than other machines having the same make and model engine. And greater usable horsepower is bonus power that pays off in easier digging, faster cycles, more production and profits.

The variation in the amount of power a given model engine actually makes available in the form of line pull (or power at the drums) is determined primarily by the net horsepower the engine delivers at the output shaft. Engine Model X, for example, when run at 1200 rpm, develops *75 hp*. At 1600 rpm, it develops *100 hp!* That's a difference of 33% in *usable hp!*

### Equipment must be designed and built to handle extra usable horsepower and speeds

Because the Link-Belt Speeder line is industry's most advanced in design—17 new models—it incorporates the latest developments in engineering, metallurgy and fabricating. As a result, every Link-Belt Speeder is an "extra strength" machine—a shovel-crane with the added guts and stamina to take full advantage of the bonus horsepower available (within recommended operating speeds) in any engine.

A Link-Belt Speeder's extra strength is evident in its

**MORE USABLE HORSEPOWER** permits the operator of this Link-Belt Speeder K-360 to "sock" the bucket into the cut . . . come up with a full-load fast, first pass. There's no need to "shave" the bank or back off for fear of stalling.

upper and lower frames. They're all-welded, and by the most modern processes including the submerged arc technique to assure deep penetration. Then, as are all major weldments in a Link-Belt Speeder, frames are stress relieved. This assures greater strength and freedom from dangerous shrinkage strains and hidden stresses that might cause failure and warpage.

### Heavier components handle heavier loads

More evidence of a Link-Belt Speeder's extra strength is available upon examination of shafts. They have extra size and heft . . . are made from tough, high-alloy steels and precision-machined. What's more, all shafts are splined for greater strength and less wear . . . maximum power transmission efficiency.

Then, too, clutches are designed and built to handle additional power with ease. They have alloy-cast iron clutch drums (the finest friction material known). Lining material was carefully chosen on the basis of how it would work in conjunction with drum material. This, plus basic design, results in clutches that can consistently take the full operating pressure of the engaging forces with maximum effectiveness and smoothness—but with little chance for uneven wear.

Other noteworthy clutch features: generous size swingers and drum clutches . . . most models have interchangeable clutches within each model . . . and all clutches are self-compensating for heat and normal lining wear.

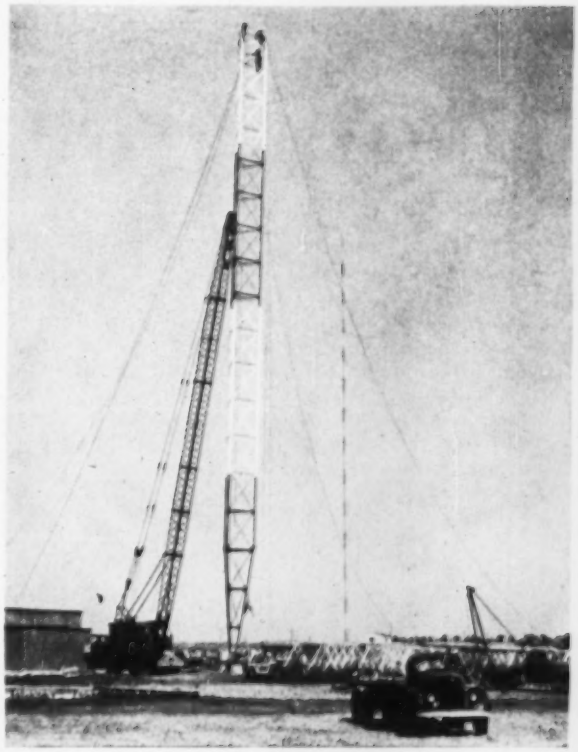
### Are you paying for power you never use?

If you don't have a Link-Belt Speeder on the job, chances are you're passing up a great opportunity to increase your production and profits without the need for going to bigger machines. Why not have a talk with your Link-Belt Speeder distributor today? He has many field reports to back up the Link-Belt Speeder usable horsepower story. Or write—LINK-BELT SPEEDER CORPORATION, CEDAR RAPIDS, IOWA. 14.218

# LINK-BELT SPEEDER

*Builders of a complete line of shovel-cranes . . . with exclusive Speed-o-Matic power hydraulic controls*

**POWER HYDRAULIC CONTROLS**, a Link-Belt Speeder exclusive, are fingertip operated. The operator gets fast, positive, easy response and perfect "feel" to take full advantage of his machine's added usable power . . . further increase daily output.



**EXTRA POWER MEANS EXTRA SAFETY IN CRANE WORK.** Large, heavy loads can be handled more safely . . . at any speed and with greater speed range selectivity.

**FASTER MACHINE MOVEMENT** is another benefit resulting from greater usable horsepower. This Link-Belt Speeder heavy-duty ¾ yard LS-88 has the extra power not only to dig, but also to swing, hoist, dump and travel.